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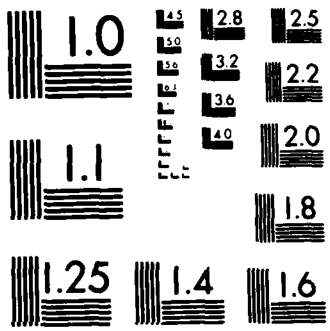
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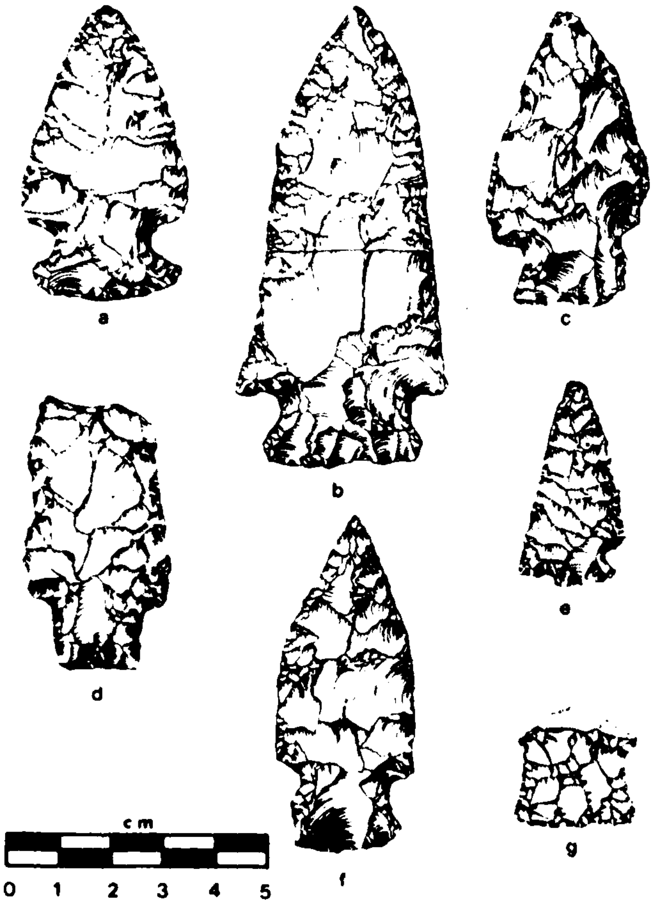
US Army Corps
of Engineers
Kansas City District

Little Blue River Channel
Jackson County, Missouri

University of Kansas Museum of
Anthropology, Lawrence, Kansas

Prehistoric Cultural Resources within the Right-of-Way of the Proposed Little Blue River Channel
Part I



Assembled by

Kenneth L. Brown and
Robert J. Ziegler

1985

DACW41-77-C-0086

PREHISTORIC CULTURAL RESOURCES WITHIN THE RIGHT-OF-WAY OF THE PROPOSED LITTLE BLUE RIVER CHANNEL, JACKSON COUNTY, MISSOURI

PART I

assembled by

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An Archaeological Project Conducted for the Kansas City District of the U. S. Army Corps of Engineers, Contract No. DACW 41-77-C-0086

University of Kansas Museum of Anthropology

1985

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This report describes archaeological, geomorphological, and palynological investigations conducted at selected sites within the Little Blue River channel-modification project in Jackson County, Missouri. Eight sites were investigated. Hypotheses are formulated on changes in the prehistoric settlement and subsistence patterns for the Little Blue River Valley. Changes which have occurred, through time, in social, economic and technological systems are presented.

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ABSTRACT

This report describes archaeological, geomorphological, and palynological investigations conducted from 1977 to 1979 at selected sites within the Little Blue River channel-modification project. The Museum of Anthropology at the University of Kansas entered into contractual agreement with the U. S. Army Corps of Engineers in mitigation of the impact upon cultural resources. Seven sites were tested: 23JA32, 23JA36, 23JA40, 23JA79, 23JA80, and 23JA115. Site 23JA55 was visually examined. Three sites, 23JA40, 23JA85 and 23JA115 were extensively excavated to retrieve as much archaeological information as possible within the allocated time and budget.

Phosphate and particle size analyses of soils from the archaeological sites were performed to determine intra-site activity patterning and the geomorphic history of the Little Blue River Valley. Palynological analysis was conducted on sediments having high organic content.

Prehistoric components represented include Late Archaic, Early Woodland, Middle Woodland, Late Woodland, and Middle Mississippian. Large artifact collections representing Early Woodland, Late Woodland and Middle Mississippian components were obtained. A number of hypotheses are formulated concerning changes in prehistoric settlement and subsistence patterns for the Little Blue River Valley. Descriptions of changes which have occurred, through time, in the social, economic and technological systems are presented.

ACKNOWLEDGEMENTS

Financial support for the testing and excavations of sites located within the right-of-way of the proposed channel of the Little Blue River was made possible by a contract between the Kansas City District of the U. S. Army Corps of Engineers and the University of Kansas. The work was accomplished only with the help of many people. Two field crews were used to excavate the sites. The field crew for the summer of 1977 consisted of: Kenneth Brown, Robert Ziegler, Chris Wright, Joe Artz, Dean Braa, Joe Schmidt, Dan Bentley, Lynn Swift, Kathy Harris, Genie Trapp, Ken Lassman, Jane Dogenais, Hal Ragier, Shiela Orth, Roger Saft, Mark Baumler, Mike Barton, Don Bower, Tom Dureka, Nancy Hassett, Stewart Johnson, Tom Reust, Gail Larson, Doug Stinson, Karen Stoltz, Gary Hardiman, Rebecca Filer, Ray Mueller, and Jeff Patton.

The 1978 field crew consisted of: Kenneth Brown, Robert Ziegler, Patricia Miller, Nancy Hassett, Dan Bentley, Stewart Johnson, Mary Swift, Don Bower, Kathy Stanley, Ken Lassman, Mike Windheuser, Jim Calcagno, Albert Johnson, Casey King, Genie Trapp, Janae Fuller, Elizabeth Anderson, Dana Cope, Jan Delir-Rooifard, and Karen Stoltz.

We would especially like to thank Charles Sperry, Joe Bolger, Darrell Herman, Thomas Tierney and Mike Casey for assisting us in our endeavors and allowing us to cross their private property to gain access to the sites. We also thank William Landahl, director of the Jackson County Park Department, for his assistance. Special thanks go to Jean Colglazier and Patricia Renjifo for their superb illustrations of artifacts. Norman Carpenter, of the University of Kansas Cartographic Service, produced many of the maps which illustrate this volume.

Archaeological laboratory analysis was assisted by Patricia Miller, Nancy Hassett, Janae Fuller, Elizabeth Anderson, Brad Logan and Marie Klon. Faunal remains were examined by Don Bower, of the Department of Anthropology, and Dr. Larry Martin of the Museum of Natural History. Floral remains recovered from sites 23JA40 and 23JA115 were identified by H. A. Stephens, formally of the University of Kansas Herbarium, and remains from sites tested and 23JA85 were identified by Steve Churchill of the University of Kansas Herbarium. Dr. Ronald McGregor, of the University of Kansas Herbarium, examined grass impressions in burned earth and daub.

Soil studies were assisted by Dr. Curtis Sorenson, Raymond Mueller, Rebecca Filer and Jeff Patton, of the University of Kansas Department of Geography. The final editing of the report was done by Dr. Alfred E. Johnson. His assistance and support throughout the entire project are very much appreciated. The support and assistance of the personnel, of the Kansas City District of the U. S. Army Corps of Engineers, for the duration of this project are very much appreciated.

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CHAPTER I

Project Background

by

Kenneth L. Brown

Introduction

This report presents the findings of archaeological, geomorphological and palynological investigations within the right-of-way of the proposed Little Blue River channel-modification project, Jackson County, Missouri. The Little Blue River channel-modification is being performed by the Kansas City District of the U. S. Army Corps of Engineers. During the spring of 1977, the Museum of Anthropology at the University of Kansas and the U. S. Army Corps of Engineers entered into contractual agreement, Number DACW41-77-0086, in mitigation of the impact upon cultural resources by providing for extensive archaeological excavations at sites 23JA40, 23JA85 and 23JA115, and for testing of sites 23JA32, 23JA36, 23JA55, 23JA79 and 23JA80. If excavation of the latter sites appeared warranted, such work could be accomplished by modification of the contract.

The sites are located in the lower and middle portion of the Little Blue River Valley. Six site maps, showing the location of the sites, are provided in the site descriptions. The index map (Fig. 1.1) shows the position of each of the six site maps.

The work defined herein is called for in the National Historic Preservation Act of 1966 (P.L. 89-665) and is authorized for funding under Public Law 86-523 as amended by Public Law 93-291. The work provides documentation evidencing compliance with Executive Order 11593 "Protection and Enhancement of the Cultural Environment" dated 13 May 1971, Section 2(a).

Level of Effort

Investigations during the channel-modification project were conducted over a period of three years. Field work was begun in June 1977 and continued until August 1977. Laboratory analyses, of cultural remains recovered during the summer, were done from August 1977 until May 1978. The second phase of field work was performed from May 1978 until August 1978. Laboratory analyses of recovered cultural remains were performed from August 1978 until May 1979. A modification to the contract was made in June 1979 to perform additional testing at site 23JA36. Field work, in compliance with the modification to the contract, was performed at 23JA36 in June 1979. Laboratory analysis and final report preparation was conducted from June 1979 until September 1979. A draft of the report of findings was submitted to the U. S. Army Corps of Engineers in October 1979.

The amount of human effort toward the completion of this project amounts to greater than 2,993 man-days (23,946 man-hours). This level of effort can be divided into the field work, laboratory analysis, and report preparation (Table 1.1). The figures in Table 1.1 do not include all of the volunteer hours which went toward the completion of this report. The level of effort which would have been invested in the testing of site 23JA55 was transferred to sites 23JA36 and 23JA40 (see Ziegler, this volume), since these two sites warranted additional work.

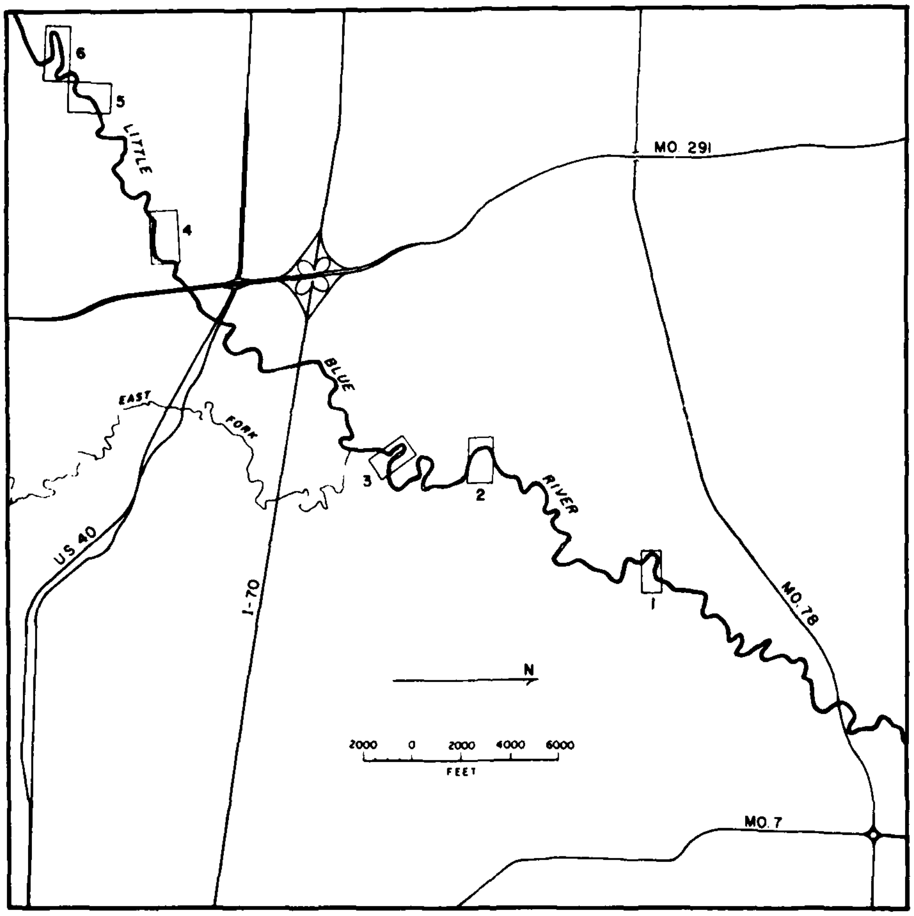


Figure 1.1 Index map showing the position of each of the six site maps.

Development of the Research Design for the Little Blue River Channel-Modification Project

Previous archaeological research in the Little Blue River Valley by Heffner (1974; and Martin 1976), and Reid (1975) was used to evaluate the course of action for implementation of this project. The Museum of Anthropology at the University of Kansas has been conducting archaeological research in the Little Blue River Valley in Jackson County, Missouri since 1973.

During the spring of 1973, the University and the National Park Service entered into a contractual agreement, Number CX6000-3-0068, authorizing the Museum of Anthropology to conduct a preliminary survey in the valley. The purpose of the survey was to assess the impact of channel-modification and lake construction on the archaeological resources within the impact areas. Fieldwork was completed in June and July 1973 (Heffner 1974:1).

During the spring of 1975, the University and the U.S. Army Corps of Engineers entered into contractual agreement, Number DACW41-75-M-1648, authorizing the Museum of Anthropology to conduct a second and more thorough cultural resource survey along the Little Blue River Channel. The purpose of the survey was to assess the impact of channel-modification along the Little Blue River Corridor from Blue Mills Road upstream to the southern boundary of Stage IV construction above Little Blue, Missouri. The survey area included all of Stages I-IV, as well as the channel corridor upstream of Grandview, Missouri. Historic, prehistoric and historic-architectural resources of the channel corridor were evaluated (Reid 1975:1).

During the summer of 1975, the University of Kansas and the U.S. Army Corps of Engineers entered into a contractual agreement, Number DACW41-76-M-0197, authorizing the Museum of Anthropology to conduct test excavations of significant sites located in the Stage I construction area (Heffner and Martin 1976: 1).

Table 1.2 summarizes the recommendations from the cultural resource surveys (1974, 1975, 1976). It has been stated previously (Heffner 1974; Heffner and Martin 1976; Reid 1975), that channel-modification will have an immediate impact upon the prehistoric cultural resources located in the Little Blue River Valley. The valley was occupied over a long period of time, and channel relocation will destroy evidence of this occupation. Prior to the work described herein, all cultural resource studies for the channel-modification of the Little Blue River had been confined to the location and tentative cultural-historical identification of sites. Of the 89 known sites located along the Little Blue River above Blue Mills Road, 47 had not been adequately assessed as to their cultural affiliation. Data retrieval had been limited to surface collections from all sites and preliminary test excavations at six sites: 23JA82, 23JA84, 23JA85, 23JA86, 23JA122, and 23JA123 (Heffner and Martin 1976).

The absence of inter-site and intra-site data from sites located adjacent to the Little Blue River made it necessary to employ a method from which hypotheses concerning intra-site and inter-site variability could be formulated to guide future archaeological research in the Little Blue River Valley. A preliminary evaluation of the prehistoric settlement-subsistence systems in the Little Blue River Valley was conducted for determining future archaeological research in the area. The value of settlement archaeology is that it attempts to define the total range of prehistoric social phenomena, not just the activities carried out at a specific site (Brown 1976; Baumler 1976).

Table 1.1

Level of Effort Toward the Completion of the Project

Field Work Division		Man Days
23JA32		18
23JA36		112
23JA40		384
23JA55		1
23JA79		105
23JA80		80
23JA85		396
23JA115		418
Soil Core Sampling		100
Palynological Sampling		6
Earthmoving Equipment		4
	Sub-Total	1,624

Laboratory Work Division		Man Days
Soil Analyses		72
Palynological Analyses		5
Artifact Analyses		1,092
Cartography		37
Illustration		75
Report Preparation		87
	Sub-Total	1,368
	Grand Total	2,992

Table 1.2

Site Survey Recommendations of 1974, 1975 and 1976.
(Heffner 1974; Heffner and Martin 1976; Reid 1975)

Recommendations of 1974		Recommendations of 1975		Recommendations of 1976
Test	Excavate	Test	Excavate	Test
23JA 32	23JA 9	23JA107	23JA110	23JA 84
23JA 36	23JA 10	23JA109	23JA115	23JA 85
23JA 38	23JA 35	23JA111	23JA136	23JA 86
23JA 42	23JA 40	23JA112		
23JA 49	23JA 44	23JA11		
23JA 55	23JA 54	23JA119		
23JA 78	23JA 77	23JA120		
23JA 79	23JA 89	23JA122		
23JA 80		23JA123		
23JA 81		23JA129		
23JA 82		23JA133		
23JA 83		23JA137		
23JA 84				
23JA 85				
23JA 86				
23JA103				
23JA104				
23JA105				
23JA142				
23JA143				
23JA144				

Data collected during previous surveys indicated that the project area contained significant numbers of different types of archaeological remains to enable formation and subsequent testing of the following hypotheses (Brown 1976: 56-57):

1. The Little Blue River Valley was occupied for a great length of time, from at least the Early Archaic to the present.

Test: Test excavations of sites located during earlier surveys in the Little Blue River Valley should produce artifacts distinctive of particular time intervals and should indicate a long span of occupation in the area.

2. Occupation and use of the area includes permanent campsites or villages which were situated near available water resources and adjacent to several ecosystems capable of supplying other resources needed to maintain the camp or village.

Test: The extensive excavation of a minimum of three sites, containing materials representative of the entire temporal span of human occupation in the area, should yield data indicating year-round occupation of sites and the resources extracted from surrounding ecosystems to maintain them.

3. The area includes temporary campsites and activity areas where general maintenance and specialized activities were carried out, respectively.

Test: Excavations at sites, distant from resources hypothesized as necessary for the year-round maintenance of a site should yield data indicative of the seasonal occupation of the sites.

4. Temporary campsites were situated at or immediately adjacent to specialized resources that were extracted from the environment.

Test: Excavations of sites, determined to be seasonally-occupied, should yield data indicating the resources extracted from surrounding ecosystems to maintain the site.

5. Basic settlement and subsistence patterns have changed during the occupation of the area.

Test: Determination of temporal placement and function of sites, through test and contiguous excavation units should allow for pattern recognition of subsistence and settlement patterns for each culture period represented in the valley. A comparison of these patterns should indicate either change or stability through time.

6. Archaic and Woodland site locations are a function of the seasonal availability of resources of the vegetation zones in the area.

Test: Excavations of Archaic and Woodland sites will result in the acquisition of floral and faunal data necessary to establish whether sites were seasonally utilized.

7. Early prehistoric sites (Paleo-Indian and Archaic) are deeply buried in the alluvium of the Little Blue River Valley.

Test: Subsurface soil analysis will allow for the reconstruction of the depositional history of the Little Blue River Valley, allowing predictions of buried sites.

8. Climatic and vegetation patterns have changed during the time of human occupation in the area.

Test: Chemical analysis of subsurface soils and pollen, gastropod and opal phytolith analyses will enable the reconstruction of past climates and vegetation in the area.

Additional goals of this project included eliminating the void in knowledge of the Paleo-Indian and Archaic temporal periods in the Kansas City area. Site testing and soil analyses indicate these early sites may be deeply buried in the T-1 (first terrace) and T-2 (second terrace)

along the Little Blue River (see Filer and Anderson, this volume) (Johnson 1978). A second goal was the recovery of cultural data in sufficient quantity and representativeness of later culture complexes to allow the development of models of subsistence-settlement patterns comparable with others which had been developed for surrounding areas (see Brown, this volume). Finally, the third goal was to describe and explain changes, which occur through time, in the social, economic and technological systems of the prehistoric peoples.

Compatibility of the Research Goals with the Theoretical Orientation in Archaeology in General

The above hypotheses were a framework within which the research during the channel-modification project would be conducted. Certain of these hypotheses and research goals would be answered in the first phase of research aimed at gathering background information on sites specified within the contract. Additional hypotheses would be formulated after further field work had been conducted. The framework for which the archaeological work was to be conducted was meant to be general in outline and subject to change once field work was begun. The absence of inter-site and intra-site data makes it difficult to present a more specific framework for future research (Brown 1976:58).

Archaeology is currently assessing the merits of the inductive and deductive approaches to data retrieval and analysis. Combining the best of these two theoretical approaches is probably best suited to contract archaeology. The logic of empirical science is in its completeness when inductive and deductive forms and procedures are combined. The creation of hypotheses is necessary to give direction to research and to determine what further data should be collected (Watson _et al_. 1971: 10-12).

In this project, the inductive approach consisted of the collection of data in the field and a search for patterns. Recovered materials were analyzed and hypotheses generated to explain and describe observed phenomena. The hypotheses were then subjected to tests with independent data, through use of the deductive approach, to determine their validity. This method of formulating hypotheses, determining test implications, refining the research strategy, and the acquisition and analysis of additional data in order to assess whether the original hypotheses should be modified or rejected is called the hypothetico-deductive approach (Ruppert 1975:5). Additional hypotheses need to be formulated and previous hypotheses need to be altered or rejected with the collection of new data.

Implementation of the Research Design

Three sites were excavated for maximum data recovery, 23JA40, 23JA85 and 23JA115, and five sites were tested to provide the necessary data for documentation of the hypotheses and research goals above. Implementation of the research design was a three year program, each year including periods of field work followed by periods of laboratory analysis. The work was initiated in June 1977 and terminated in June 1979. The first year, 1977, following an inductive approach, was designed to determine temporal placement and function of the above sites. The inductive analysis was based on the manipulation of seven basic data categories: 1) site situation information; 2) surface collections; 3) excavated materials; 4) geographic data; 5) ecological data; 6) ethnographic information; and 7) pre-existing data from previous research (Brown 1976).

During June and July 1977, sites 23JA36 and 23JA40 were plowed and controlled-gridded surface collections were made. Surface grab samples were made at sites 23JA79 and 23JA85. The sparse surface scatter of cultural remains at 23JA79 and 23JA85 did not warrant controlled-gridded surface collections. Sites 23JA32 and 23JA80 did not have surface collections made because people leasing the lands would not allow the fields to be plowed.

Test pits consisting of manually excavated 1 X 1 meter and 1 X 2 meter units were conducted at six sites: 23JA32, 23JA36, 23JA40, 23JA79, 23JA80 and 23JA85. Test pits were placed over the sites to determine vertical and lateral extent of cultural deposits.

The relative temporal placement of the sites was established by stylistic analysis of artifact categories, specifically pottery, projectile points and associated artifacts. Floral and faunal remains recovered from the excavations aided determination of site functions and the seasons of the year during which they were occupied.

The controlled-gridded surface collections yielded large quantities of artifacts for the recognition of variability of activities within 23JA36 and 23JA40. It was assumed that surface indications are indicative of subsurface materials and features. This assumption proved correct for site 23JA36, where several hearths were located and subsequently excavated (see Ziegler, this volume). The assumption was incorrect at site 23JA40 (see Ziegler, this volume), where large concentrations of burned earth were located, and subsequently excavated, but were not of prehistoric origin.

An important aspect of the "inductive phase" of the research was use of subsurface soil analysis and test trenching to generate data to predict intra-site activity areas and locate deeply buried Paleo-Indian and Early and Middle Archaic sites (see Filer and Anderson, this volume). The soil analyses for determining intra-site activity areas did not produce positive results. The uniformity in phosphate readings across all of the sites did not produce the expected variability needed for the method to work. A similar study at the Young Site, 23PL4, in Platte County, Missouri, proved successful (Zabel 1976).

The use of deep soil cores and trenching was also not as productive as expected. Extensive trenching was done at 23JA85 (see Filer, this volume) with no evidence of a deeply buried component. A total of 14 deep soil cores were obtained from along the Little Blue River Valley (see Filer, this volume). Particle size analysis of the sediments indicates the recent depositional environment for the Little Blue River Valley has been stable. The uniformity in the sediments from cores obtained in 1976 (see Anderson, this volume) and 1977 makes it impossible, with our current knowledge, to predict the exact location of deeply buried sites on the Little Blue River floodplain.

Additional trenching was not done, and deep soil cores were not obtained from sites 23JA32, 23JA36, 23JA55, 23JA79 and 23JA155 because of difficulties in site accessibility with a trailer mounted Giddings soil probe and the crossing of private lands. Private landowners adjacent to sites 23JA32, 23JA36, 23JA55, 23JA79 and 23JA155 would not permit vehicles or tractors to cross their property to gain access to the sites. This reduced the potential of using trenches and the soil probe to locate deeply buried components at the above sites.

Test excavations at 23JA36 indicated further excavation was warranted. Additional excavations were conducted in June 1979 (see Ziegler, this volume). These excavations resulted in the recovery of Early Wood-

land artifacts and associated charcoal samples for radiocarbon determination.

Extensive excavation at 23JA85 (see Brown, this volume) aided in formulating hypotheses to explain intra-site variability and activity areas. Recovered artifacts and radiocarbon determination of charcoal place the excavated component, which is in the channel-modification right-of-way, as being Late Woodland. This makes site 23JA85 the only extensively excavated Late Woodland site in the Kansas City area.

Hypotheses generated from data collected during the first year of field work were subjected to tests during the second year of field work in June and July 1978. A controlled-gridded surface collection, test excavations, and an extensive excavation were conducted at 23JA115 and extensive excavations were conducted at 23JA40. Field procedures varied among the sites, depending upon archaeological context. More specific excavation procedures are included with each site description.

The analysis of surficial cultural debris, collected by means of a controlled-gridded procedure, aided in assessing the horizontal variability at sites 23JA40 (1977) and 23JA115 (1978). Analysis of artifacts from the surface of site 23JA40 indicated the presence of Late Archaic and Late Woodland components. However, excavations conducted in 1977 did not yield significant remains. Test excavations did determine the existence of undisturbed cultural remains beneath the plow zone. Initial work in 1978 involved the removal of the plow zone with the aid of power equipment to expose cultural features which could be mapped and excavated. Excavated features and activity areas during 1978 yielded data indicating the presence of an Early Woodland occupation. This data, in conjunction with data recovered from 23JA36 in 1977, was instrumental in confirming and defining Early Woodland components in the Kansas City area. There are only three Early Woodland sites excavated in the Kansas City area, and two of them (23JA36 and 23JA40) were investigated during this project. The third Early Woodland site is the Traff Site, 23JA159, which was excavated in 1978 by the Museum of Anthropology under contract with Burns and McDonald, Engineering Company. These data help fill the void between the Late Archaic and Middle Woodland (Kansas City Hopewell). These Early Woodland components yielded data which appear to be transitional between Late Archaic (Nebo Hill and Langtry complexes) and Kansas City Hopewell.

Analysis of the controlled-gridded surface collection from 23JA115 indicates a Kansas City Hopewell and a later, Mississippian-like, component are present and horizontally separated (see Brown, this volume). Subsequent test excavations located a buried component on the slope of the T1 along the edge of the Little Blue River. Extensive excavations recovered artifacts different from any currently known in the Kansas City area. Radiocarbon determination indicates an occupation dating A.D. 1265± 50. Excavations at 23JA43, which is located two kilometers from 23JA115, by Soils Systems Incorporated for the city of Lee's Summit, recovered an artifact assemblage similar to that from 23JA115. This new cultural complex has been named the Maybrook phase (see Brown, this volume). A number of questions and hypotheses have been formulated concerning this new archaeological complex in the Kansas City area (see Ziegler and Brown, this volume).

Methods used during all excavations included: excavating in natural stratigraphic levels when possible, three-dimensional plotting of all tools, and contents of all features processed by water flotation and screening. A flotation device, which was a modification of the SMAP

machine (Watson 1976:82-4) (Fig. 1.2), was used for water flotation and screening. Water flotation and screening yielded large quantities of botanical remains which were used in inferring the season of site occupation, subsistence resources and prehistoric environments in the Little Blue River Valley.

One of the goals of the project was the acquisition of charcoal samples for radiocarbon dating. This was achieved, and a total of 13 radiocarbon dates from four sites were derived. This information was used in establishing a temporal ordering for the prehistoric culture sequence in the Little Blue River Valley.

Prehistoric Culture Sequence

Introduction

The sequence of occupation in the Little Blue River valley can be divided into a series of 'periods' indicative of technological, exploitative, and settlement systems. Data used to define some of the earlier 'periods' (Table 1.3) are tentative and, for the most part, derived from areas near the Little Blue River valley. The later 'periods' are well represented in the Little Blue River valley and are, for the most part, defined on the basis of the local archaeological data recovered during this project. Table 1.1 shows a summary of taxonomic systems utilized by authors who have conducted research in the Plains and Midwestern United States. The taxonomic system used in this report is based on the ones developed by Johnson (1974) and Chapman (1975). Johnson's taxonomic system was derived from data collected from along Brush Creek in Platte County, Missouri, a distance of only 50 km northwest of the confluence of the Little Blue and Missouri Rivers. The revised system is based on data recovered from along the Little Blue River, and is considered a local system applicable to only the Little Blue River valley and adjacent areas.

Paleo-Indian (12,000 to 8,000 B.C.)

The initial period for which evidence of human occupation in the Kansas City area has been found is the Paleo-Indian period. This period is represented only by isolated surface finds of fluted Clovis projectile points. Information from other areas (Frison 1978) indicates that the people of this period were nomadic groups of hunter-gatherers depending primarily upon now-extinct fauna. Judging from the absence of fauna normally associated with Paleo-Indian remains and the scarcity of fluted projectile points, it is assumed that their use of the region was minimal or sites are deeply buried. Two sites, 23JA12 and 23JA117, were possible Paleo-Indian sites. Site 23JA12 was destroyed by the construction of Lake Jacomo and 23JA117 is privately owned and in cultivation.

Early Archaic (8,000 to 5,000 B.C.)

In the Kansas City area, this period is represented by surface finds of Dalton, Hardin Barbed, and Agate Basin-like projectile points. Beginning in this period and continuing through the entire Archaic sequence, there was a diversification of the resources being utilized. There is a general lack of knowledge of human occupation in the Kansas City area for the Early Archaic period.

Figure 1.2 Flotation device used for soil flotation and water screening.

Table 1.3

Summary of Taxonomic Systems Utilized by Authors Who Have Conducted Research in the Plains and Midwestern United States

	Kansas Antiquities Commission	Johnson 1974	Chapman 1975	Wedel 1959	Little Blue Valley Sequence
1800	Historic		Historic	Kansa	Historic
1600	Late		Late		
	Ceramic		Mississippian	Oneota	
				Aspect	
1400					Maybrook
	Middle		Middle	Nebraska	
	Ceramic		Mississippian	Aspect	
1200		Steed-	Early		Steed-
		Kisker	Mississippian		Kisker
1000					
		Late		Hopewellian	Late
		Woodland	Late		Woodland
500	Early		Woodland		
	Ceramic	Kansas City	Middle		Kansas City
AD		Hopewell	Woodland		Hopewell
BC					Early
			Early		Woodland
		Late	Woodland		Nebo
1000		Archaic			and
			Late		Langtry
2000			Archaic		
		Middle		Archaic	
4000	Archaic	Archaic	Middle		Middle
			Archaic		Archaic
6000					
		Early	Early	Paleo-	Early
8000		Archaic	Archaic	Indian	Archaic
	Paleo-		Dalton		
10000	Indian		Paleo-		Paleo-
			Indian		Indian
12000			Early		
			Man		

Middle Archaic (5,000 to 3,000 B.C.)

This period is represented by a side-notched projectile point complex (Martin 1976:18). The complex is represented by surface finds and small sites (Reeder 1978). There is a general lack of knowledge of human occupation in the Kansas City area for the Middle Archaic period.

Nebo Hill and Langtry Complexes (3,000 to 500 B.C.)

This period is thought to be represented by two lithic complexes, the Nebo Hill lanceolate point complex and a contracting stemmed point complex hereafter referred to as the Langtry complex (Martin 1976:18). Recent excavations at the Nebo Hill type site, 23CL11 (Reid 1978), and the Sohn site, 23JA110 (Reeder 1978), indicate Nebo Hill was a hunter-gatherer complex exploiting the forest-prairie ecotone. The recovery of fiber tempered potsherds from 23CL11 extends the known range of this earliest North American ceramic ware further north and west (Reid 1978:247).

The Langtry complex, characterized by contracting stemmed projectile points and unifacial end scrapers (Martin 1976:18), is represented by surface finds and small sites. There is a general lack of knowledge of human occupation in the Kansas City area for the Langtry complex. These distinctive projectile points and scrapers blend with the Early Woodland period.

Early Woodland (500 B.C. to A.D. 1)

The Early Woodland period is defined on the presence of fairly large quantities of sand-tempered, cordmarked pottery associated with the contracting stemmed projectile points. One site, 23JA36 (see Ziegler, this volume), was tested and subsequently assigned to the Early Woodland period. Sand-tempered potsherds with semi-lunar punctates superimposed over cordmarking, similar to Black Sand ware in the Illinois River valley (Shippee 1967:10), in addition to a radiocarbon date of 450 ± 85 B.C. (UGa-1873), indicates an Early Woodland presence along the Little Blue River valley. Two additional sites, 23JA40 and 23JA159, have had contiguous excavation units dug (see Ziegler, this volume). The Early Woodland component at site 23JA40 yielded radiocarbon dates of 350 ± 110 B.C. (UGa-2351) and A.D. 100 ± 140 (UGa-2350). No ceramic ware was recovered from this component (see Ziegler, this volume). The excavated component at the Traff site, 23JA159, yielded some sand-tempered pottery and radiocarbon dates of 395 ± 70 B.C. (UGa-2535) and 505 ± 80 B.C. (UGa-2404) (Christopher Wright, personal communication). Both sites yielded corner-notched dart and spear points.

Kansas-City Hopewell (A.D. 1 to A.D. 500)

This complex is characterized by corner-notched and shallow side-notched or expanding stemmed projectile points. The pottery is grit-tempered, with the earliest forms having a variety of decorative configurations on the rims while later forms usually have plain surfaces. Vessels are conical in shape. Large villages in the river valleys are associated with this period. Ancillary camps are found upstream of the larger villages. Burial mounds are on bluffs adjacent to the larger village sites. It is believed subsistence was based primarily on hunting and gathering with only minimal reliance on agriculture (Johnson 1976:7-15). In this volume, surface finds from the Seven Acres site, 23JA115, (see Brown, this volume), are assigned to the Kansas City Hopewell complex.

Late Woodland (A.D. 500 to A.D. 1000)

This period is characterized by small, asymetrical, corner-notched and unnotched arrow points made on small flakes. Pottery consists of both plain (about 80%) and cordmarked (about 20%) exterior surfaces. Pottery is predominately tempered with crushed granite and sherds. Sites tend to be small, seasonally occupied encampments. There is a general lack of evidence for the use of tropical cultigens. Sites tend to be relatively clean, in that lithic and pottery debris do not occur in great quantities. The lithic assemblages are characterized by small flake tools with marginal retouch. Larger bifaces are uncommon. One site, the Sperry site, 23JA85 (see Brown, this volume), is assigned to the Late Woodland period. A widebase hunter-gatherer subsistence strategy appears to have been employed.

Steed Kisker Complex (A.D. 1000 to A.D. 1250)

This complex is characterized by small, triangular, side-notched arrow points. Shell-tempered pottery with plain surfaces and globular shapes also characterize this complex. Maize agriculture was practiced, with hunting and gathering of locally available flora and fauna still of great importance. Houses are square to rectangular in outline and were of wattle-and-daub construction (Wedel 1943:67-71; Shippee 1972). Small clusters of haphazardly placed houses on the floodplain tend to characterize the settlement pattern. Low, circular burial mounds occur on bluff tops adjacent to some of the small villages.

Maybrook (A.D. 1250 to A.D. 1700)

This complex is presently represented by only two excavated sites, 23JA43 and 23JA115, the Seven Acres site (see Brown, this volume). This complex is characterized by small, triangular side-notched and unnotched arrow points. A great variety in notching forms exist for the arrow points. Multiple side-notched forms tend to be most frequent. Pottery is predominately shell-tempered with either plain (38%) or cordmarked (61%) exterior surfaces. Subsistence was on a wide variety of locally available flora and fauna. No house remains have been recovered.

Historic (A.D. 1700 to Present)

Sites assigned to the Historic period pertain to the time of European settlement of the area. The presence of porcelain, glass and metal are the main cirteria for defining sites as Historic.

Environmental Setting

Introduction

Jackson County is located in a prairie region that forms the transition between the Dissected Till Plains north of the Missouri River and the Osage Plain which is between the Great Plains and the Ozark Plateau (Pflieger 1971:241). Topographically this area is characterized by gently undulating plains and wide, shallow river valleys. Near the major streams the plains become more dissected and hilly. The river valleys are covered for the most part by alluvial sediments. The hilltops, especially near the Missouri River, have thick loess deposits which are characterized by light yellowish-brown silt which becomes darker and less thick to the south (McCourt 1917:70).

The little Blue River is typical of the streams in the area. Stream banks are relatively high and steep and are composed of alluvial deposits. The floodplains are generally wide with meandering evident in many places (McCourt 1917:14). There are two principal terraces along the Little Blue river as defined by Johnson (1978: 237-244). The lower terrace and relatively younger one, consists of alluvium that is very late Holocene in age, probably less than 1000 years old. The soil developed on it is a Typic Udifluvent. The soil is maintained in a state of immature development due to the addition of fresh alluvial material at the top of the profile which subsequently buries the existing A horizon (O'Malley 1979:12).

The upper terrace, and relatively older one, has a more developed soil, a Dystric Fluventic Eutrochrept, developed on alluvium which began accumulating about 11,000 years ago and which ceased accumulating to any great extent about 2,000 years ago. The upper 25 to 50 cm of sediments consists of deposits younger than 2,000 years (Johnson 1978:242).

The general soil types of the area have been classified as:

1. Blackoar-Zook soil association for the alluvium of small streams. These soils are subject to frequent flooding, wetness and slow permeability;
2. Mandeville-Snead association: These were once forested soils but some areas have subsequently been cleared. Campsite impediments include steep slopes, slow permeability and clayiness;
3. Polo-Sogn association: These soils are permeable to water. Campsite impediments include steep slopes, clayiness and wetness;
4. Sharpsburg: These soils are good for campsites. Minor impediments include slow permeability, wetness and clayiness (Mausel et al. 1976: 1-39).

Hydrology of the Little Blue River

The Little Blue River is a tributary of the Missouri River. It is characterized by relatively wide floodplains and infrequent rapids. The channel is deep with steep mud banks of three to four meters (McCourt 1917:14). The drainage area basin of the Little Blue River encompasses 225 square miles. The basin extends 38 miles with a maximum width of 13 miles (Missouri Department of Business and Administration 1967:269).

Based on data from the Lake City gaging station, located about 20 stream km or 15 km by air from the confluence of the Little Blue and Missouri rivers, flooding occurs frequently in the lower portions of the river valley. Most floods occur from April to July (58.2%) with August to November (23.8%) following. The winter months from December to March are least likely to experience flooding. A discharge of 2410 cubic feet per second, which corresponds to approximately .65 meters above bankfull stage, has an 80% probability of occurring in any given year. There is a 50% probability that a discharge of 4000 cfs will occur in any given year, which corresponds to approximately two meters above bankfull stage (O'Malley 1979:10).

Analysis of deep soil cores (Filer and Sorensen 1977) (See Filer and Anderson, this volume), indicates that sediment contributions and energy levels have been relatively stable and the frequency of meandering appears to have been relatively low. The unpredictability of floods during the months from April through July appears to make the occupation of the floodplain sites, particularly those close to the channel, unlikely during these early summer months. Occupation of these sites seems most likely to have occurred during the late summer, fall, winter and possibly early spring.

Climate

This part of the United States is classified as temperate continental (Trewartha, Robison, and Hammond 1968:117). There are severe seasonal variations in temperature and precipitation. January is the coldest month, with a mean temperature of -1.3 C, while the warmest month is July, with a mean temperature of 26.4 C (based on Kansas City station records from 1936 to 1975). The average number of days between the last and first freeze is 207 (National Weather Service) (Table 1.4). Precipitation variability can amount to 50% more or 50% less than the mean annual amount (Rumney 1968:351) (Table 1.3). The mean annual precipitation is 93.2 cm per year. The lowest amounts occur in January while the maximum amounts occur in May and June (National Weather Service; Rumney 1968:350).

Past Environments

The reconstruction of past environments in a region is complex. One source used by archaeologists is the paleoenvironmental record preserved at sites. This is a reliable method since floral and faunal remains are usually directly related to the prehistoric environment. However, this method is dependent upon the recovery of sensitive environmental indicators, such as pollen or gastropods. Unfortunately, no pollen or gastropods were recovered from any of the prehistoric sites from along the Little Blue River (See King, this volume). Environmental reconstructions based on macro-faunal and macro-floral remains provide only general characteristics of the past environment.

A second method of environmental reconstruction is based on an analysis of the modern environment of a region. Zawacki and Hausfater's (1969) reconstruction of the vegetation of the Lower Illinois River Valley and Baumler's (1976) reconstruction of the vegetation of the Little Blue River Valley are examples of these types of studies. Problems are encountered with these types of studies when attempts are made to project modern vegetation patterns into the prehistoric past. The present study will use a combination of both of the above methods to derive a probable prehistoric environmental sequence for the lower portions of the Little Blue River Valley.

It has been postulated that major environmental events occurred at approximately 7190 B.C., 6500 B.C., 4030 B.C., 2730 B.C., 940 B.C., A.D. 260 and A.D. 1190 (Bryson, Baerreis, and Wendland 1970:63). The dates of significant environmental change were derived by analysis of radiocarbon dates in ten volumes of Radiocarbon (1959-1968) (Table 1.5).

Selecting only those dates thought to be significant by the person who wrote the sample description, and which also indicated geologic discontinuities, the number of radiocarbon dates to be analyzed was reduced to 620. The frequency with which the 620 radiocarbon dates fell within each two centuries of the last 10,000 years was counted and subjected to a least-square computer fit of the normal distribution to actual radiocarbon dates. Results showed the radiocarbon dates tended to cluster into the seven major times of disconcontinuity listed above. These seven major times of discontinuity represent an objective consensus of the times at which major environmental changes occurred (Bryson, Baerreis, and Wendland 1970:53-54).

Since diagnostic cultural remains recovered from Jackson County postdate 1000 B.C., only the last 3,000 years are of concern to this study. At approximately 940 B.C., the beginning of what has been termed the Sub-Atlantic, it is hypothesized that the summers were more moist

Table 1.4

Precipitation and Temperature for the Kansas City Region

Mean monthly precipitation:

	J	F	M	A	M	J	J	A	S	O	N	D
inches	1.35	1.46	2.59	3.40	4.70	4.82	3.85	3.95	4.30	2.91	1.87	1.46
cm	3.43	3.71	6.58	8.64	11.94	12.24	9.78	10.03	10.92	7.39	4.75	3.71

Mean monthly temperature:

	J	F	M	A	M	J	J	A	S	O	N	D
F	29.7	33.1	43.2	55.5	65.3	74.7	79.5	78.0	70.0	59.1	44.7	33.6
C	-1.3	0.6	6.2	13.1	18.5	23.7	26.4	25.6	21.1	15.1	7.1	0.9

(from Feagins 1977:7-8)

Table 1.5

Climatic Episodes as Defined by Bryson and Wendland (1967)

Episode	Rough Date
Recent	A.D. 1850 to Present
Neo-Boreal	A.D. 1500 to A.D. 1850
Pacific	A.D. 1190 to A.D. 1500
Neo-Atlantic	A.D. 260 to A.D. 1190
Sub-Atlantic	940 B.C. to A.D. 260
Sub-Boreal	2730 B.C. to 940 B.C
Atlantic	6500 B.C. to 2730 B.C.
Boreal	7190 B.C. to 6500 B.C.
Pre-Boreal	8500 B.C. to 7190 B.C.
Late Glacial	- 8500 B.C.

than during the preceding Sub-Boreal period. This hypothesis is based upon the rapid spread of <u>Pinus strobus</u> in Minnesota, for white pine is found only in more moist climates. The character of the winters during the Sub-Atlantic period is not known. However, it appears that the winters were stormier and the westerlies were further south (Bryson and Wendland 1967:294). When the westerlies occur in North America, "the prairie peninsula is occupied by a wedge of air, dried by subsidence on crossing the Rockies, which is driven eastward by the westerlies. The stronger the westerlies, the farther east the dry wedge should push, and with it the associated biota" (Bryson, Baerreis, and Wendland 1970:64). An abnormally strong westerly circulation for a period of a month or several months has been observed to result in subnormal precipitation during the same periods in the Great Plains of North America (Borchert 1950:18).

Since it is postulated that the westerlies were to the south during the Sub-Atlantic this would allow more moist air to be present in the Central and Northern Plains. At approximately A.D. 260, during the beginning of what has been called the Neo-Atlantic, weak westerlies returned during the summer, and the Northern Plains became somewhat drier. It is believed summer rains extended farther into the southwest and maize agriculture became feasible across the Great Plains (Bryson and Wendland 1967:294).

At approximately A.D. 1190, during the beginning of the Pacific episode, the westerlies increased. During this climatic episode, it is postulated that summer rains diminished in the Northern and Central Plains, while the Southern Plains in Oklahoma and Texas received increased rainfall. The drier conditions in the Northern and Central Plains displaced grassland communities east across Illinois and into Indiana (Bryson and Wendland 1967:294).

At approximately A.D. 1500, at the beginning of the Neo-Boreal, or 'Little Ice Age', summers were cool and autumns cold in the Eastern United States. Summer precipitation in northern New Mexico appears to have been two to three inches (5 to 7.5 cm) greater than the recent normal.

Beginning at about A.D. 1850, or the recent, a return of strong westerlies brought more xeric conditions to the Great Plains, with intermittent droughts (Borchert 1950:12).

The above climatic episodes are partially supported by pollen cores from northeast Kansas (Grüger 1973). Paleoenvironmental changes are not simple, with past climates varying regionally (Baerreis and Bryson 1965: 214). Changes in temperature are not necessarily correlated with changes in precipitation (Bryson, Baerreis, and Wendland 1970:55).

The vegetation of Jackson County, as it appeared in 1820, has been reconstructed by Baumler (1976). A qualitative, quantitative and spatial analysis of reconstructed vegetation characteristics of the Little Blue River Valley, using U.S. Government Land Survey records (c. 1820), combined with ecological studies by Turner (1931) and Mackenzie (1902), permited the definition of five vegetation zones:

1. Missouri Floodplain Forest (MFF); 2. Tributary Floodplain Forest (TFF); 3. Slope-Upland Forest (SUF); 4. Floodplain Prairie (FP); and 5. Upland Prairie (Up) (Table 1.6) (F'gure 1.3).

The vegetation reconstruction was based on analysis of 'modal prevalent species' within each vegetation zone. A modal prevalent species is defined as a species which has its maximum presence value in the given plant community (Curtis 1959:82). This is based on the fact that certain

Table 1.6

Frequency and Relative Percentage of Tree Types within Three Proposed Tree-Bearing Vegetation Zones

Tree Type	Missouri Floodplain Forest		Tributary Floodplain Forest		Slope-Upland Forest	
	Freq.	%	Freq.	%	Freq.	%
Ash	6	3.14	1	0.82	7	0.008
Black Oak	22	11.58	30	24.79	272	31.000
Black Jack	0	0.00	0	0.00	3	0.003
Black Walnut	5	2.60	12	8.80	38	4.000
Box Elder	14	7.37	0	0.00	0	0.000
Burr Oak	0	0.00	9	7.40	5	0.006
Cedar	0	0.00	0	0.00	1	0.001
Cherry	0	0.00	3	2.48	2	0.002
Coffee Nut	1	0.52	0	0.00	1	0.001
Coffee Tree	2	1.05	0	0.00	3	0.003
Cottonwood	9	4.70	0	0.00	0	0.000
Crab Apple	0	0.00	0	0.00	1	0.001
Elm	35	18.40	19	15.70	83	9.000
Hackberry	21	11.05	6	4.95	24	3.000
Hickory	6	3.15	7	5.78	117	13.000
Honey Locust	1	0.52	0	0.00	1	0.001
Ironwood	0	0.00	0	0.00	4	0.005
Linn	5	2.60	4	3.30	25	3.000
Locust	4	2.10	0	0.00	2	0.002
Maple	3	1.58	3	2.48	1	0.001
Mulberry	9	4.70	1	0.82	5	0.006
Pin Oak	0	0.00	4	3.30	21	2.000
Post Oak	0	0.00	0	0.00	9	1.000
Red Oak	1	0.52	1	0.82	10	1.000
Sugar Tree	1	0.52	0	0.00	2	0.002
Sycamore	26	13.68	2	1.65	1	0.001
White Oak	19	10.00	19	15.70	244	28.000
Totals	190	99.82	121	99.99	882	99.000

(adapted from Baumler 1976:20)

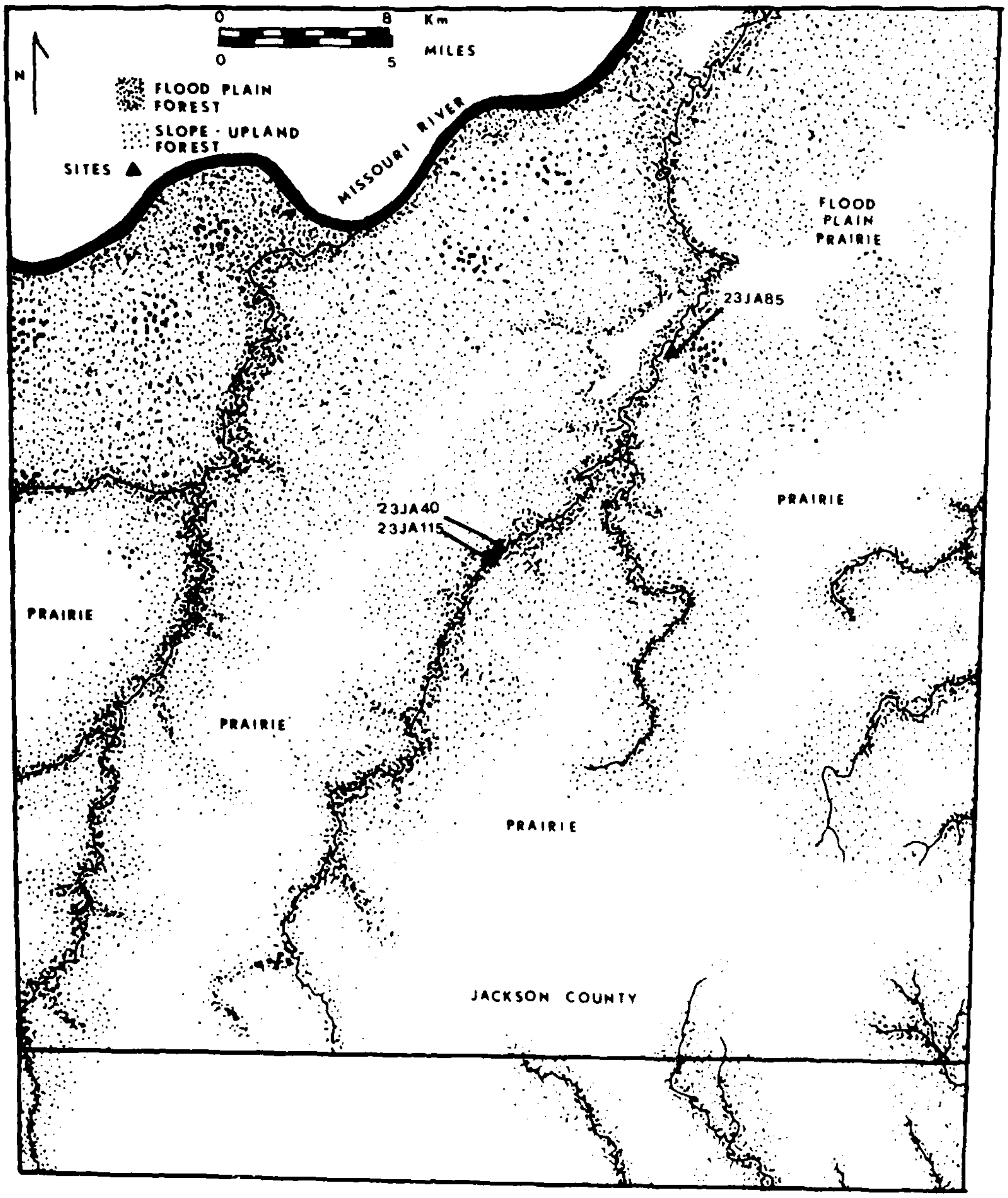


Figure 1.3 Map showing the vegetation zones and location of sites 23JA40, 23JA85 and 23JA115.

species prefer mesic habitats, while others prefer more xeric habitats. The three tree-bearing vegetation zones reconstructed from the 1820 U.S. Government Land Survey records include a Missouri River floodplain forest, a tributary floodplain forest, and a slope-upland forest community. Upland prairie and floodplain prairie communities are also recognized, based upon the descriptions of the surveyors (Baumler 1976).

There are two components to the phytogeography of the Little Blue River region reflected in the reconstruction of the early vegetation. First, there are three zones paralleling the Missouri River: the Missouri River floodplain forest, slope-upland forest, and the upland prairie. These succeed one another in a vegetation continuum as one goes south from the Missouri River (Fig. 1.4). Perpendicular to this component are the influences of the Little Blue and Big Blue Rivers. These rivers have established their own distinctive floodplain forest. Linear stretches of slope-upland forest parallel their course and intrude into the upland prairie (Fig. 1.5).

This configuration of perpendicular vegetation continua undoubtedly allowed the prehistoric inhabitants of the Little Blue River Valley to exploit a wide variety of faunal and floral resources by locating their settlements in strategically defined areas. The 1820 U.S. Government Land Survey records fall within the end of the Neo-Boreal, or 'Little Ice Age' climatic episode proposed by Bryson, Baerreis and Wendland (1970). This is postulated as a period of moist, cool summers for the Northern and Central Plains area. The tree species present in the Kansas City area should reflect these moister conditions by displaying mesic species further into the slope-upland areas of the dissected prairie.

Examination of Table 1.6 shows the slope-upland forest dominated by black oak, hickory, white oak, and elm, the tributary floodplain forest by black oak, black walnut, burr oak, elm, and white oak, and the Missouri River floodplain forest by black oak, box elder, elm, hackberry, sycamore and white oak. It may be assumed that the reconstructed vegetation for Jackson County (Baumler 1976) would be applicable to the Sub-Atlantic and possibly the Neo-Atlantic climatic episodes. Bryson and Wendland (1967:292) state that from the Atlantic (6500 B.C. to 2730 B.C.) on, variations in climate were small deviations from present climatic distributions. Pollen data from Muscotah marsh in northeastern Kansas indicate that at 3150 B.C. the prairie border ended there with the development of forest vegetation beginning. Oak-hickory forests formed along the river valleys and prairie dominated the uplands. This is similar to the present vegetation in northeastern Kansas (Grüger 1973:249).

Jackson County, which is 113 km to the southeast, is similar to this. Forests dominate the river valleys and slope-uplands and prairie the uplands (Baumler 1976). All flora and fauna represented by remains recovered from prehistoric sites dating between 950 B.C. to A.D. 1190 are present in the Kansas City area today.

The Pacific climatic episode (A.D. 1190 to A.D. 1500), is postulated to have had diminished summer rains in the Northern and Central Plains (Bryson and Wendland 1967:294). During this episode, vegetation better adapted to a more xeric environment should have displaced the more mesic, slope-upland forest communities. Floral data recovered from the middle reaches of the Little Blue River support more xeric climatic conditions at this time. Two charred nutshell fragments of Arizona walnut (Juglans microcarpa) from the Seven Acres site, 23JA115 (See Brown, this volume) which is radiocarbon dated A.D. 1265 ± 50, is possible evidence for a

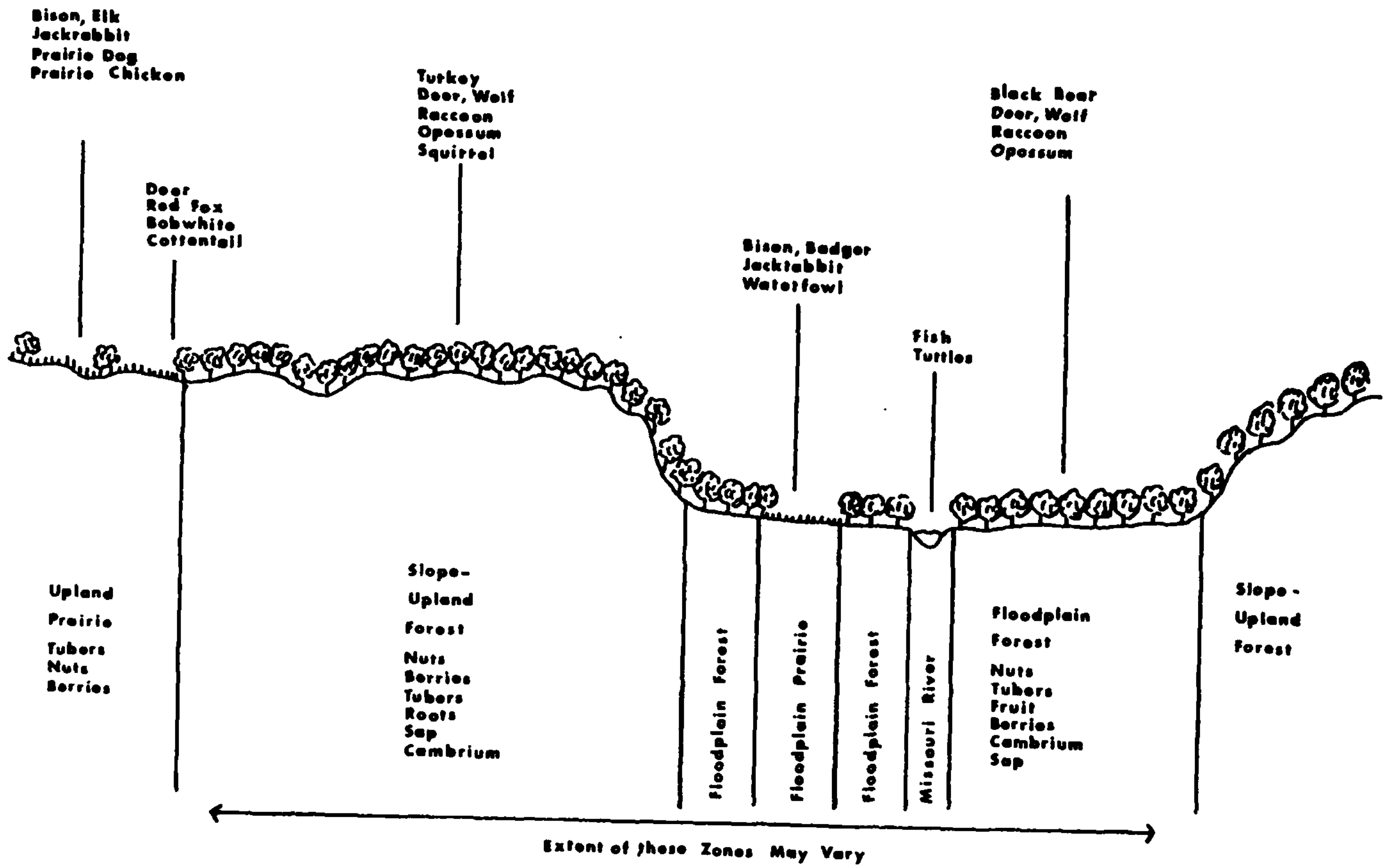


Figure 1.4 Phytogeographic-subsistence potential model of the Lower Missouri River Valley (from Baumler 1976:42).

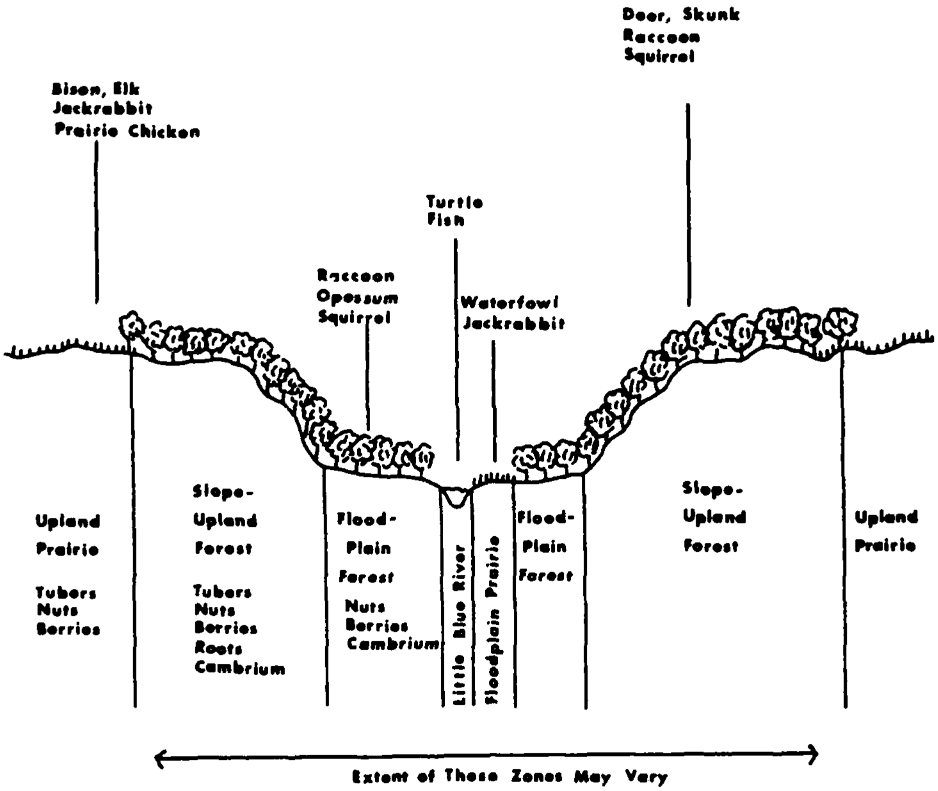


Figure 1.5 Phytogeographic-subsistence potential model of the Little Blue River Valley (from Baumler 1976:40).

drier climate at this time. Arizona walnut is no longer found in Missouri. Presently, it is limited to southwestern Kansas, western Oklahoma, Texas, New Mexico, Arizona, and northern Mexico (Stephens 1973:74), all areas with warm, dry climates.

One hypothesis formulated to account for the presence of Arizona walnut (Juglans microcarpa) in the Kansas City area at A.D. 1265, is related to the Pacific climatic episode postulated by Bryson, Baerreis and Wendland (1970). It is expected that vegetation change will lag, somewhat, behind climatic change. Consequently, it can be postulated that, since Arizona walnut is only represented by two charred nutshell fragments, it was in the process of establishing itself in the area at the time the Seven Acres site was occupied.

The inhabitants of the site were relying primarily upon black walnut resources. The low frequency of Arizona walnut can be attributed to either its small size and low food value (H.A. Stephens, personal communication), or that it was only occasionally gathered due to its different taste.

What is needed are additional floral data from the Kansas City area which can be assigned to the Pacific climatic episode. It is hypothesized that a more xeric environment was present in Jackson County at A.D. 1265, based upon remains of charred Arizona walnut recovered from 23JA115.

Chert Resources

Introduction

The majority of artifacts recovered from sites excavated along the Little Blue River consist of chipped stone tools and manufacturing debris of local chert. Three cherts, Winterset, Westerville and Argentine, outcrop in Jackson County. Emphasis is on Winterset chert which is most abundantly represented at sites along the Little Blue River.

Identification

The three local cherts are derived from the Winterset, Westerville, and Argentine limestone members of the Kansas City Group (Zeller 1968) (Fig. 1.6). Natural outcrops of Winterset Limestone are often masked by a covering of soil, derived largely from overlying shales. Most of the narrow ridges along the Little Blue River are capped by Winterset Limestone. The limestone has a thickness of about 30 feet (9 m) with the upper portion containing nodules and thin beds of black or blue chert (McCourt 1917:46-48). The chert nodules and beds may or may not be present at all outcrops of Winterset Limestone.

Westerville Limestone varies from 6 to 20 feet (2 to 6.5 m) in thickness. The upper portion is exposed in several places along the upper reaches of the Big Blue River, and it occurs infrequently along the upper reaches of the Little Blue. Layers of tabular chert may occur within this limestone deposit. Natural outcrops would only occur in the upland prairie near the headwaters of the Little Blue River (McCourt 1917:52-53).

Argentine Limestone is the uppermost member of the Kansas City Group. It is the surface formation over a large part of the western half of Jackson County. The narrow divide between the Big and Little Blue Rivers is capped by this limestone. Natural outcrops are abundant along the headwaters of the Big Blue River. Argentine is the thickest lime-

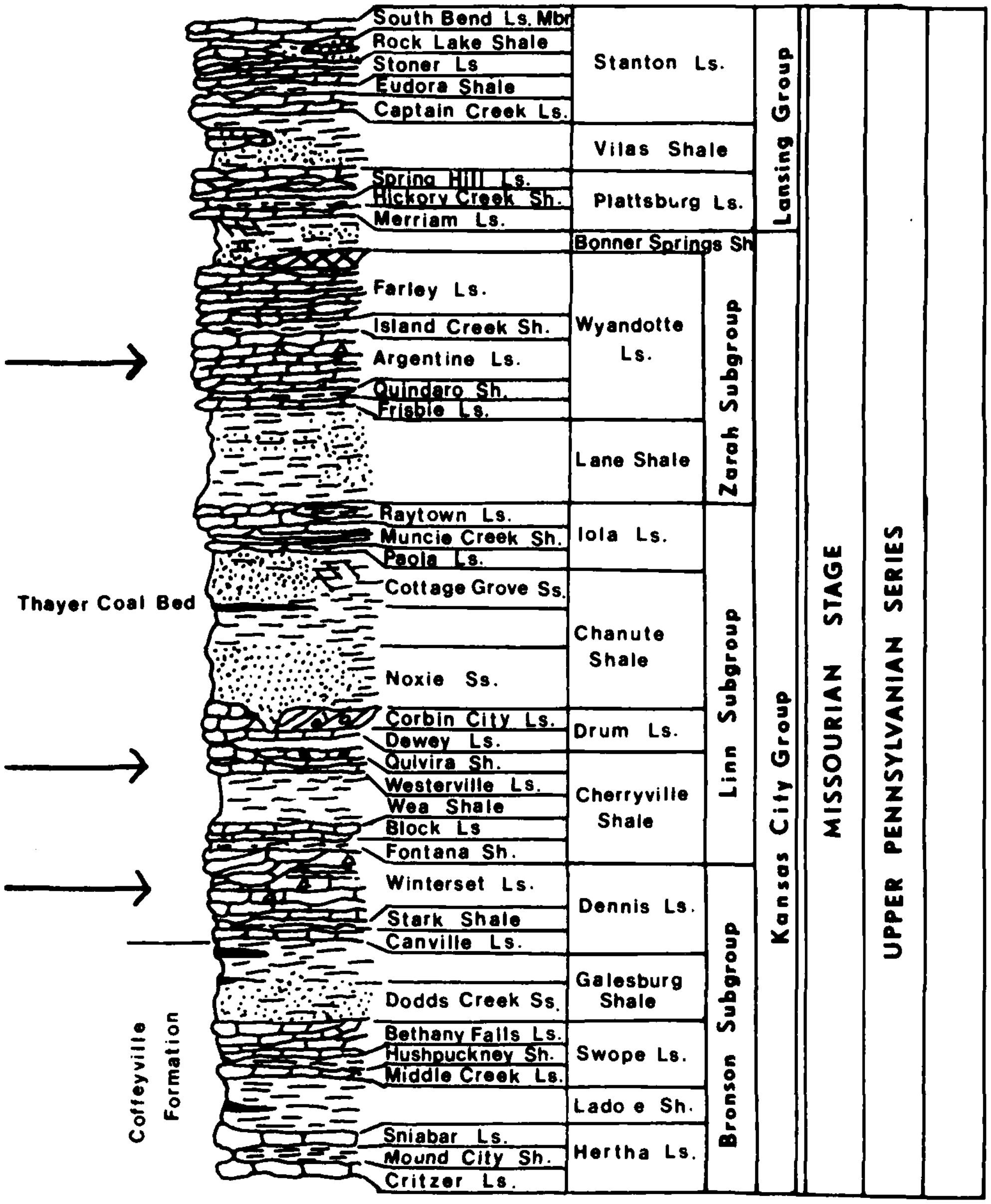


Figure 1.6 Stratigraphic position of chert-bearing limestone members in the Kansas City area (from Zeller 1968).

stone in the county, having a maximum of 43 feet (13 m). However, because it is a surface member, the top portion has been removed by erosion, leaving only the middle and lower portions. At different localities "it contains a large amount of chert which is commonly strewn over the ground in the residium formed by the weathering of the limestone" (McCourt 1917:63).

Physical Properties

Winterset chert, Table 1.7, with its calcite inclusions, often breaks with irregular fractures. Westerville chert, Table 1.8, however, lacks inclusions and always breaks with a conchoidal fracture. These properties made Winterset chert less suitable than Westerville for the manufacture of light duty bifaces, such as the lanceolate projectile points associated with the Nebo Hill Complex (Reid 1978:67). Prehistoric remains from along the Little Blue River suggest a change in the frequency of the utilization of some chert types. Nebo Hill components tend to have higher frequencies of Westerville chert, in the form of invasively worked light and heavy-duty tools, than do components of later complexes. Analysis of cherts at the Sohn site, 23JA110 (Reeder 1978: 186-190), for Nebo Hill and Kansas City Hopewell components indicate Winterset chert was used for 77% of the 44 Hopewellian points, but for only 44% of the 47 Nebo Hill points. Westerville and Argentine cherts were used in 45% of the Nebo Hill points, but in only 18% of the Hopewellian points. The anomaly appears to reflect a technological constraint imposed by the raw material.

Later cultural complexes tend to have shorter tool forms than those of the Nebo Hill and Langtry Complexes. The Late Woodland, Steed Kisker and Maybrook Complexes are characterized by flake tool assemblages where the technological constraint imposed by Winterset chert was of little consequence, since small, homogenous blocks of Winterset produce conchoidal fractures with regularity, and thus predictability.

Heat Treatment

Kenneth C. Reid of the Museum of Anthropology at the University of Kansas has experimentally heated pieces of local Kansas City cherts. He states that (Reid 1978:69-70) Westerville chert when heated for eight hours at 600° C in an electric kiln turns from light gray (10YR7/1) to a combination of pink (5YR7/3) and reddish gray (5YR6/1). These colors replicate those observed on artifacts suspected to have been made from heat-treated Westerville chert. Argentine chert was heated for eight hours at temperatures ranging from 200° to 400° C. Color changes occurred after heating for only 30 minutes at 400° C. Flakes of Argentine chert turned from dark reddish gray (5YR4/2) to weak red (5YR5/3).

Winterset chert pieces were heated at temperatures of up 650° C for as long as 14 hours without exhibiting any discernible color change. These experiments showed that heat-discoloration in these cherts does not incorporate the entire mass of the heated piece. Discoloration is usually restricted to the outermost few millimeters of the block of raw material. When flakes are struck from the blank they may exhibit only marginal rather than invasive heat-discoloration (Reid 1978:70).

Table 1.7

Description summary of Winterset chert.

Type locality:	SW ¼ of the SW ¼, Sec. 23, T51N, R31W, Clay County, Missouri.
Morphology:	Tabular chunks Tabular slabs Tabular blocks
Texture:	Smooth, ordinary
Internal structure:	Homogeneous Layered Mottled
Colors:	Light gray (7.5YR7) Gray (2.5YR5,6) Dark gray (2.5YR4) Very dark gray (2.5YR3) Very pale brown (10YR7/4) The very pale brown color appears on heavily weathered surface pieces, and as occasional thin bands within darker gray colored pieces.
Inclusions:	Abundant veins, vugs and laminae of bright-white calcite give this chert its "zebra-striped" appearance. Silicified fossil inclusions are common to abundant.
Cortex:	Yellow (10YR8/6) White (7.5YR8) Fossils are abundant in the cortex and in the Winterset limestone generally.
Comments:	Local quarrymen refer to this material as "zebra chert" because of its calcite bands or stripes. Jewett et al. (1968:29) describe this chert as "black" in the Kansas River area, but it is more commonly dark bluish-gray in Clay and Jackson Counties.

(from Reid 1978:58)

Table 1.8

Descriptive summary of Westerville chert.

Type locality:	SE ¼ of the NW¼, Sec. 9, T51N, R31W, Clay County, Missouri.
Morphology:	Tabular slabs Tabular blocks Nodular cobble fragments Nodular boulder fragments
Texture:	Smooth, ordinary Granular, fine Granular, coarse Chalky
Internal structure:	Layered Mottled Homogeneous
Colors:	Light gray (10YR7/1) Very pale brown (10YR7/3,4) Pale brown (10YR6/3) Light yellowish brown (10YR6/4) Brownish yellow (10YR6/6,8) Yellowish brown (10YR5/4)
Inclusions:	Fossils are present but rarely abundant in Clay County samples. Veins and vugs of white calcite are present but not common. Large, calcareous solution cavities sometimes flaw the interior of a slab or blank.
Cortex:	Light Yellowish brown (10YR6/4) Reddish yellow (7.5YR7/6,8) Fossils are present, but not as abundantly as in the other cherts.
Comments:	Jewett et al. (1968:30) describe this chert as "light pink" but Reid's observations indicate that this is a superficial weathering phenomenon restricted to exposed faces, especially in road cuts.

(from Reid 1978:57)

Table 1.9

Descriptive summary of Argentine chert.

Type locality:	NW ¼ of the NE ¼, Sec. 4, T50N, R33W, Platte County, Missouri.
Morphology:	Nodular pebbles Nodular cobbles
Texture:	Smooth, ordinary Granular, fine
Texture Internal structure:	Mottled
Colors:	Light brown (7.5YR6/4) Dark reddish gray (5YR4/2) Light gray (10YR7/1) Very pale brown (10YR7/2)
Inclusions:	Silicified fossil crinoids are abundant in the chert and in the yellowish brown cortex. Bright-white, gypsum-filled vugs occur in some nodules.
Cortex:	Light yellowish brown (10YR6/4) Yellow (10YR8/6) White (10YR8/1)

(from Reid 1978:59)

Transformation Processes

Introduction

Vertical and horizontal displacement of artifacts from their original deposition may result from a variety of natural and cultural causes. These form what Schiffer (1976:11) describes as "transformation processes". The recognition and understanding of these processes is necessary in order to acquite a more realistic understanding of the relationship between the past cultural system and its archaeological record. The processes recognized to have influenced the spatial distribution of artifacts at the seven sites tested and excavated will be briefly described here.

Natural Transformations

The soils, which all of the sites in this volume occur within, have developed from alluvial sediments of reworked loess which has eroded from the bluffs and upland areas and has been redeposited by the Little Blue River. Soils of the Little Blue River generally have a silty clay texture. These sites are all located on Blackoar-Zook soil associations. These soils are frequently wet and are subsequently subjected to expansion-contraction processes which redistribute materials within the soil.

The periodic flooding of these soils creates the potential of stream scouring of cultural deposits. Scouring would have several adverse effects upon the cultural deposits: 1. small items would be washed away with the surrounding soil matrix; 2. items would be horizontally displaced by water action; and, 3. stratigraphy would be collapsed or reduced in depth. All of the sites reported herein were susceptible to stream scouring. However, data point to relatively stable depositional environments (See Filer, this volume). It is believed that prehistoric settlements and artifacts have not been greatly disturbed by erosional or depositional processes.

Because the culture-bearing soils are so shallowly buried, the melanization process is of importance in evaluating the vertical provenlences of artifacts. Melanization is the darkening of a soil by the addition of organic matter (Buol et al. 1973:243). It is a process by which the soil is reworked by the burrowing and casting of earthworms, insects, and small animals.

In neutral to alkaline soils, such as those on the terraces of the Little Blue River (pH 6.0 to 7.5), there may be up to 500 earthworms per square meter of surface area (Limbrey 1975:29-30). The burial of objects in such soils is a process of soil being brought to the surface as worm casts and accumulation there, while disused burrows are constantly collapsing, and thus producing local subsidence of the overlying soil (Atkinson 1957:221; Darwin 1911: 131-232). Burrowing animals are also active in silty soils. Ground squirrels, gophers and moles overturn large quantities of soil (Thorp 1949:190).

Evidence of these natural transformation processes were observed during excavations at all of the sites reported herein. Earthworms and insects were common. Rodent burrows and disturbances in human manufactured features, such as fire hearths and pits, were observed. Skeletal remains of small rodents, such as the plains pocket gopher (Table 5.9), ground squirrel (Table 5.9) and mole (Table 6.12) in addition to snake remains (Table 5.9) attest to these agents of artifact displacement.

Controlled experiments have shown that in addition to earthworms, soil moisture and frost action can cause shallowly buried items to move

vertically (Darwin 1901:253-261). Moist soil, when slowly frozen, causes light, elongate objects to move upward in the direction of least resistance (Johnson and Hansen 1974:95). The modern average zone of frost penetration in the Kansas City area is 38.1 cm, and the deepest frost penetration recorded is 63.5 cm (Johnson and Hansen 1974:92-94).

All cultural materials recovered during the present study were susceptible to frost action, and the effects of frost action were evident at all of the sites. Most small flakes and other relatively flat, chipped stone tools, were positioned on their edges at the time of their removal. The placement of these artifacts on edge conforms to their orientation to a position of least resistance (Johnson et al. 1977:146).

Cultural Transformations

Controlled experiments have shown human treadage and scuffage have an effect on the vertical and lateral displacement of artifacts (Stockton 1973:112-117). Treadage is the vertical action of the foot, which depresses objects under foot, while scuffage is the horizontal action of the foot "where a large object is more likely to be caught squarely on the toe and forced along and up". Constant tremors of footfall may also shake small artifacts, causing them to sink deeper (Stockton 1973:117).

These forms of 'occupational disturbance' (Hughes and Lampert 1977:135-140), can create a mixing of artifacts within a zone of 20 to 30 cm. Because this zone of disturbance moves upward as the deposit grows, the result is a profile in which depth only grossly reflects age, with the stratigraphic age of artifacts blurred by the process of mixing. It is this general absence of any sharp stratigraphic division in sites within the Kansas City area which has led to the excavation of arbitrary depth units.

One way to determine the effects of the above natural and cultural transformation processes on artifacts is by cross-mending broken artifacts and comparing the vertical and lateral positions of the fragments. Tables 1.10 to 1.12 show the provenience of cross-mended artifacts from three excavated sites. The vertical displacement of the fragments is attributable to frost action, animal disturbances, and treadage. Lateral displacement is attributable to scuffage. It should be noted that the vertical extremes of cross-mended fragments are approximately 20 cm, and could be attributable solely to treadage (Hughes and Lampert 1977:135).

Table 1.10
Cross-mended Artifacts from Site 23JA40 showing displacement of artifacts by natural and cultural processes.

Artifact	Catalog Number	Horizontal Provenience		Below Surface
Shatter	A2102378-3	588.76 East	533.88 North	48 - 53 cm
Shatter	A2090678	588.50 East	533.50 North	42 - 50 cm
maximum displacement		.26 East	.38 North	-
Shatter	A2095878-1	585.00 East	531.50 North	51 - 61 cm
Shatter	A2095878-3	585.00 East	531.50 North	51 - 61 cm
maximum displacement		-	-	-
Marginally modified shatter	A2014378-1	584.50 East	529.50 North	51 - 61 cm
Shatter	A2014278-1	584-50 East	529.50 North	51 - 61 cm
maximum displacement		-	-	-
Shatter	A2075878-1	589.00 East	530.00 North	51 - 61 cm
Marginally modified shatter	A2070878	588.44 East	528.86 North	51 - 61 cm
maximum displacement		.56 East	1.14 North	-
Shatter	A2114978-2	588.00 East	534.00 North	42 - 52 cm
Shatter	A2114978-1	588.00 East	534.00 North	42 - 52 cm
maximum displacement		-	-	-
Shatter	A2063178	584.50 East	528.00 North	51 - 61 cm
Heavy duty, invasively mod.	A2035578	584.90 East	528.05 North	54 cm
maximum displacement		-	-	-
Shatter	A2105778	586.50 East	532.00 North	48 - 58 cm
Shatter	A2087778-2	584.50 East	531.00 North	51 - 61 cm
maximum displacement		2.00 East	1.00 North	-

Table 1.11

Cross-mended Artifacts from Site 23JA85 showing displacement of artifacts by natural and cultural processes.

Artifact	Catalog Number	Horizontal Provenience		Below Surface
Worked Stone	A0408877	296.25 East	479.95 North	35 cm
Worked Stone	A0408377	297.10 East	479.65 North	37 cm
maximum displacement		.85 East	.30 North	2 cm
Worked Stone	A0410077	295.75 East	480.10 North	37 cm
Worked Stone	A0408177	295.52 East	480.05 North	41 cm
maximum displacement		.23 East	.05 North	4 cm
Worked Stone	A0410277	296.50 East	480.05 North	31 cm
Worked Stone	A0410777	296.35 East	479.35 North	27 cm
Worked Stone	A0411077	295.60 East	479.60 North	38 cm
maximum displacement		.90 East	.70 North	11 cm

Table 1.12

Cross-mended Artifacts from Site 23JA115 showing displacement of artifacts by natural and cultural processes.

Artifact	Catalog Number	Horizontal Provenience		Below Surface
Mano fragment	A0261178	601.24 East	499.88 North	41 cm
Worked Stone	A0250078	601.14 East	501.90 North	46 cm
maximum displacement		.10 East	2.02 North	5.cm
Rim sherd	A0362678	595.34 East	495.11 North	48 cm
Rim sherd	A0334778	596.20 East	495.22 North	42 cm
Rim sherd	A0293578	595.50 East	497.00 North	33 cm
Rim sherd	A0334578	595.82 East	495.83 North	55 cm
maximum displacement		.86 East	1.89 North	22 cm
Rim sherd	A0330878	596.15 East	496.35 North	49 cm
Rim sherd	A0362778	595.22 East	495.36 North	39 cm
Rim sherd	A0334478	595.49 East	495.77 North	53 cm
maximum displacement		.93 East	.99 North	14 cm
Rim sherd	A0156878	601.85 East	501.09 North	31 cm
Rim sherd	A0278678	603.50 East	502.00 North	30 cm
maximum displacement		1.65 East	.91 North	1 cm
Rim sherd	A0152778	598.88 East	501.35 North	40 cm
Rim sherd	A0218578	598.65 East	501.63 North	38 cm
maximum displacement		.23 East	.28 North	2 cm
Rim sherd	A0287478	595.55 East	502.57 North	46 cm
Rim sherd	A0287578	595.65 East	502.70 North	43 cm
maximum displacement		.10 East	.13 North	3 cm
Rim sherd	A0347778	595.12 East	503.75 North	41 cm
Rim sherd	A0347678	595.22 East	503.70 North	41 cm
maximum displacement		.10 East	.05 North	0 cm

CHAPTER 2

Definitions of Artifact Classes
by
Kenneth L. Brown

Introduction

The recognition, recording, description and explanation of variability in tools has long been an established goal in archaeology. In published reports it is impractical to describe and explain each artifact recovered from a site. A more critical objection to merely describing and explaining each specimen individually is the failure to make generalizations which are a first step in all science (Dunnel 1971:18; Hempel 1952:1). It is imperative to develop a procedure to group specimens based upon empirical observations in order to comprehend variability within and between the artifacts. In order to achieve the above goal, a set of classes are constructed by means of which the specimens can be defined. The following are the classifications systems developed to describe the archaeological remains recovered from along the Little Blue River.

Three artifact classification systems are used to classify and describe cultural material recovered from sites 23JA32, 23JA36, 23JA40, 23JA79, 23JA80, 23JA85 and 23JA115.

The first classification system is based on general morphological characteristics and is used to classify all surface collections. Since all surface collections from sites along the Little Blue River are multicomponent, and therefore temporally mixed, it was determined that a simple classification system was best for these materials.

The second classification system is a more detailed, morphological-technological structure which incorporates cultural-historical significance. This stylistic typology is used for all excavated materials recovered from the Little Blue River Valley.

The third classification system is based upon chipped stone tool functions. Sackett (1973:323) and Jelinek (1976:20) state that an artifact type is dualistic and can be viewed either functionally or stylistically, but when used in comparisons of artifact variability it can assume only one of its components at a given time. Sackett uses the term 'manifold typology' to define the construction of two typologies, one in the sytlistic mode and the other in the functional mode. This resolves the problem of attempting to combine into one classification system both style and function. This is the basis for the use of a more detailed stylistic typology and a functional one.

Surface Classification System

Cultural materials collected from the surfaces of sites are classified using basic morphological attributes. Table 2.1 presents the 21 categories into which these surface collections are classified. The system used to record artifacts in the field laboratory consisted of filling out Fortran Coding Forms. Each plotted artifact and/or excavation unit was recorded in such a manner so that the information could be stored on computer tapes. The information was recorded in the following format:

Column	Museum Catalog
1- 8	artifact catalog number (sequential)
9-11	quantity
12-18	site number
19-20	feature number
21-27	east and west provenience
28-34	north and south provenience
35-40	depth provenience
41-52	artifact name
53-54	month of year
55-56	day of month
57-58	year
59-70	excavator's name
71-73	artifact category number (see Table 2.1)
79	card number (this is always computer card number 1)

In this report, all materials collected from the surface of these prehistoric sites are referred to in the following classification system (Table 2.1).

Pottery Sherds (10)

Definition: Any piece of fired clay which has a discernible interior and exterior surface which suggests it is a piece of a shaped pottery vessel.

Potential errors: Small fragments may be confused with pieces of burned earth.

Projectile Points (20)

Definition: Projectile points are lanceolate or triangular, symmetrical forms of chipped stone which have a well defined hafting element and which may have side notches, corner notches, stems and/or basal notches. The blade edges are straight to convex and the distal end terminates in a sharp point.

Potential errors: These are easily recognized.

Bifaces (40)

Definition: Any piece of chert which has been modified on both faces of the blank. Retouch must be present over both faces.

Potential errors: These are usually easily recognized.

Unifaces (50)

Definition: Unifaces are pieces of chert which have been retouched on only one face of the blank. Marginally retouched tools are included in this class.

Potential errors: Marginally modified flakes may be confused with waste flakes or debitage.

Cores (60)

Definition: Cores are any piece of chert which has a recognizable striking platform and has systematic alignment of cleavage scars on the various faces.

Potential errors: These may be confused with chunks.

Table 2.1

Artifact Classes for Surface Collections

Tool Code	Tool Name
10	pottery sherds
20	projectile points
30	unworked chert
40	bifaces
50	unifaces
60	cores
65	chunks
70	debitage
80	worked stones
90	unworked stones
100	limestone
110	hematite
120	limonite
130	burned earth
140	worked bone
150	unworked bone
160	worked shell
170	unworked shell
180	charred seeds
200	modern
230	charcoal

Chunks (65)

Definition: Pieces of chert which are cubical or irregularly shaped and lack discernible striking platforms or systematic alignment of cleavage scars on the various faces.

Potential errors: These may be confused with cores.

Debitage (70)

Definition: These are unmodified flakes. They must have at least one of the following: 1. striking platform remnant; 2. bulb of percussion; 3. compression rings; or 4. a hinge fracture (Fig. 2.1).

Potential errors: These are easily identified.

Worked Stones (80)

Definition: Pieces of stone, usually sandstone or limestone, which have been modified by grinding or pecking.

Potential errors: Stones which have plow scars may be misconstrued as grooved abrading stones.

Unworked Stones (90)

Definition: Unworked stone includes all unworked stones other than chert and limestone. Sandstone, granite, etc., are the most common forms.

Potential errors: These are easily recognized.

Limestone (100)

Definition: Pieces of unworked limestone. Often times these have indications of having been subjected to intense heat.

Potential errors: These are easily recognized. Diluted hydrochloric acid causes an intense reaction.

Hematite (110)

Definition: The mineral hematite. This does not include worked hematite. Hematite is hard and red in color.

Potential errors: Hematite may be confused with limonite.

Limonite (120)

Definition: The mineral limonite. Limonite is often times a soil inclusion and is soft and yellow in color.

Potential errors: Limonite may be confused with hematite.

Burned Earth (130)

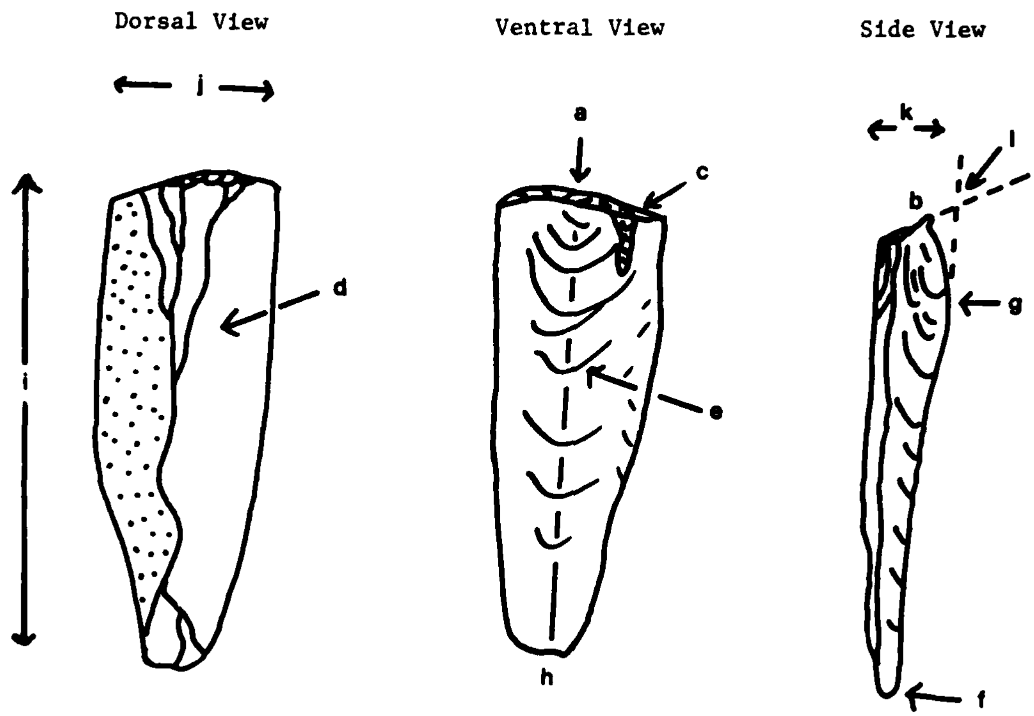
Definition: Any piece of earth which has been unintentionally fired or burned. This includes earth around hearths or fire pits and plastered earth or daub from houses.

Potential errors: This class is easily recognized.

Worked Bone (140)

Definition: Any piece of bone which has been modified into a tool or ornament.

Potential errors: Bones which have been gnawed by rodents may be confused with human modification.



a. Platform remnant

b. Lip

c. Eraillure

d. Dorsal ridge or arris

e. Compression rings

f. Hinge fracture

g. Bulb of percussion

h. Axis of percussion

i. Length

j. Width

k. Thickness

l. Platform angle

Figure 2.1 Distinctive parts of a flake or chip (from Crabtree 1972:44).

Unworked Bone (150)

Definition: Any piece of bone which has not been modified by persons.

Potential errors: These are easily identified.

Worked Shell (160)

Definition: Any piece of shell which has discernible, human modification.

Potential errors: These are usually easily recognized.

Unworked Shell (170)

Definition: Any piece of shell that does not have discernible, human modification.

Potential errors: These are easily recognized.

Charred Seeds (180)

Definition: Any piece or whole charred seed.

Potential errors: Charred seeds may not be associated with the prehistoric occupancy of a site. Modern, charred seeds may be intrusive through rodent disturbance and other natural agents.

Modern (200)

Definition: Any item which is of historic manufacture.

Potential errors: These are easily recognized.

Charcoal (230)

Definition: Any piece of charred wood.

Potential errors: Charred wood may not be associated with the prehistoric component on a site. However, it is easily recognized.

S[illegible]ic Classification System for Excavated Artifacts

[illegible]st typologies have been concerned with temporal-spatial problems, a[illegible] these cases artifact morphology and technology is the most appro-p[illegible] approach to resolve these problems. The following is a classific[illegible] system which incorporates within it a hierarchical structure for c[illegible] stone tools. Questions and answers can be derived at each level [illegible] hierarchical structure. It must be emphasized that the names [illegible] to the artifact classes are not necessarily indicative of their [illegible] The heirarchical structure for chipped stone tools is shown in [illegible].2.

[illegible] variability in the artifacts recovered from the seven components [illegible] necessary to develop generalized classes of artifacts. Examples [illegible]ht duty preforms or knives' and 'composite tools'. The format of [illegible]fact class definitions is borrowed from John House (1975:55-73). [illegible]al errors' are designed to explain problems in classifying arti-[illegible] the system.

Blank Types

Unmodified Chips (100)

Definition: Any piece of chert removed from a larger mass by the application of force (Crabtree 1972: 64), and which is less than or equal to two cm along the axis of percussion (Fig. 2.1). A portion of the chip must have at least one of the following present: 1. striking platform

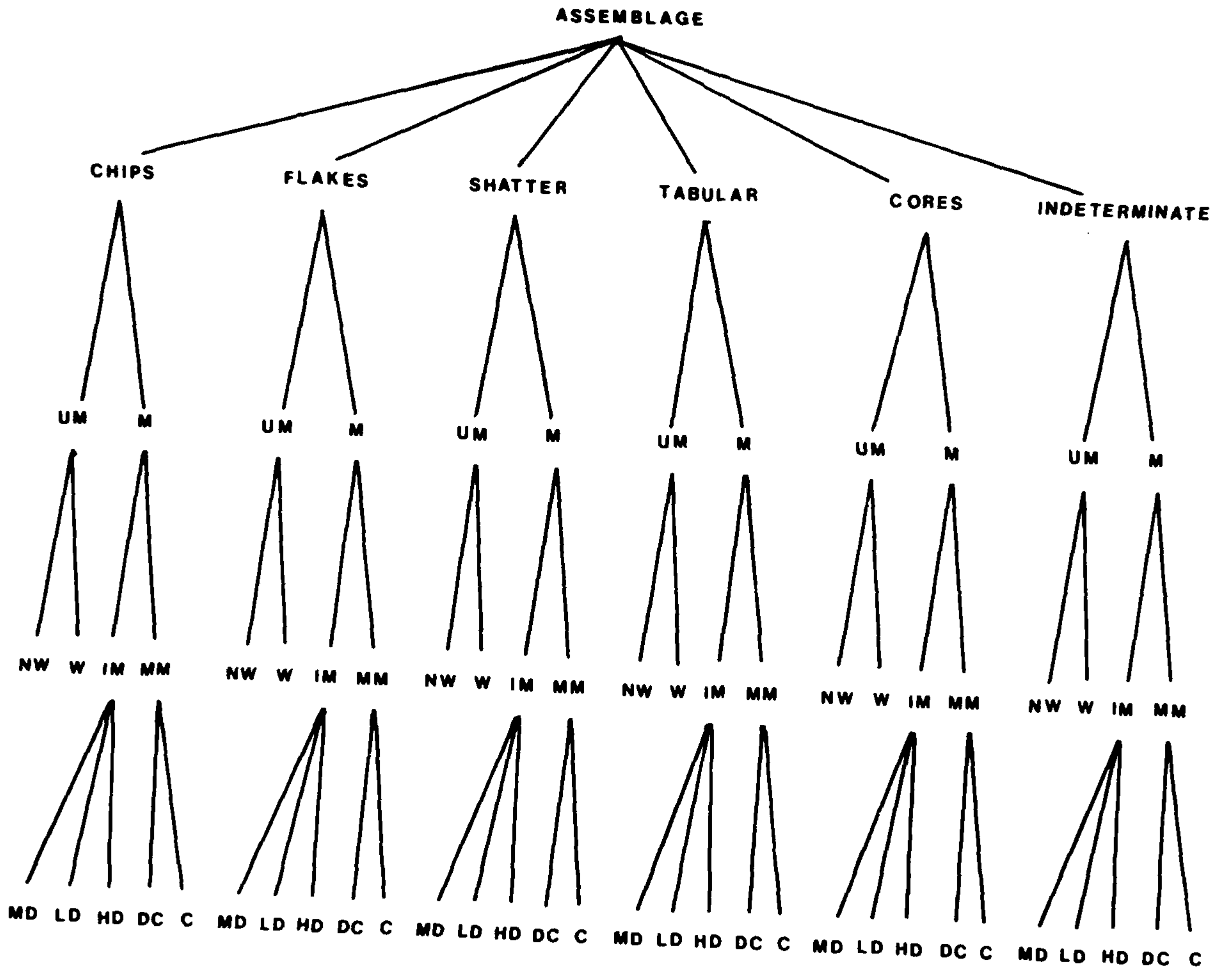


Figure 2.2 Stylistic hierarchical structure for chipped stone tools.

Key to stylistic hierarchical structure in Figure 2.2

UM	unmodified
M	modified
NW	no wear
W	wear
IM	invasive modification
MM	marginal modification
MD	micro duty
LD	light duty
HD	heavy duty
DC	discontinuous retouch
C	continuous retouch

remnant; 2. bulb of percussion; 3. compression rings; or, 4. hinge fracture.

Potential errors: Broken flakes may be identified as chips if less than two cm long.

Research value: The presence of a large number of these would indicate the location of extensive stone tool manufacturing and/or rejuvenation.

Utilized Chips (105)

Definition: The morphological characteristics are the same as those for unmodified chips, except for the addition of discernible wear along the tool margins. Retouch is either lacking or occurs along less than one cm of the tool margin.

Potential errors: These may be confused with unmodified chips.

Research value: A large quantity would indicate the maximum utilization of available raw materials.

Unmodified Flakes (300)

Definition: Any piece of chert removed from a larger mass by the application of force (Crabtree 1972:64), and which is greater than two cm along the axis of percussion (Fig. 2.1). A portion of the flake must have at least one of the following: 1. striking platform remnant; 2. bulb of percussion; 3. compression rings; or, 4. a hinge fracture.

Research value: The presence of a large number would indicate the location of extensive tool manufacture.

Utilized Flakes (305)

Definition: The morphological characteristics are the same as those for unmodified flakes, except for the addition of discernible wear along the margins. Retouch is either lacking or occurs along less than one cm of the margin.

Potential errors: These may be confused with unmodified flakes.

Research value: A large quantity would indicate the maximum use of available raw materials.

Unmodified Shatter (200)

Definition: Any piece of chert which is cubical or irregularly shaped, lacks a well-defined pattern of cleavage scars on the various faces, and also lacks a discernible striking platform (Binford and Quimby 1963).

Table 2.2

Artifact Classes

Tool Code	Tool Name	Tool Code	Tool Name
100	unmodified chips	860	light duty preforms and knives
105	utilized chips		
110	modified chips	870	light duty, specialized tools
200	unmodified shatter		
205	utilized shatter	880	light duty projectiles
210	modified shatter	900	heavy duty preforms
300	unmodified flakes	910	heavy duty, unspecialized tools
305	utilized flakes		
320	modified flakes	920	heavy duty, specialized tools
400	tabular pieces		
405	utilized tabular pieces	950	composite tools
410	modified tabular pieces	1000	hammerstones
450	unmodified cores	1010	ground stone axes
455	utilized cores	1020	abraders
460	modified cores	1030	hematite
500	end scrapers	1040	metates
510	side scrapers	1050	manos
520	disto-lateral scrapers	1060	nutting stones
600	perforators (drills)	1070	limestone
610	gravers	1080	unworked stone
700	notches	1090	burned earth
710	denticulates	1100	pottery
800	micro preforms and knives	1110	faunal remains
810	micro, unnotched projectiles	1111	charred seeds
820	micro, notched projectiles		

Micro = 0 - 6.1 mm thick
Light = 6.1 - 12 mm thick
Heavy = 12 mm and greater in thickness

Potential errors: These may be confused with cores.

Research value: The presence of a large number would indicate the testing of raw materials, which may be associated with extensive stone tool manufacture.

Utilized Shatter (205)

Definition: The morphological characteristics are the same as those for unmodified shatter, except for the addition of discernible wear along the tool margins. Retouch is either lacking or occurs along less than one cm of the tool margin.

Potential errors: These may be confused with unmodified pieces of shatter or cores.

Research value: A large quantity may indicate the maximum use of available raw materials.

Unmodified Tabular Pieces (400)

Definition: A large block of chert with at least one lateral side consisting of a natural surface rather than a trimmed edge; the intersection of the ventral, lateral and dorsal surfaces tend to be at right angles to each other.

Potential errors: These may be confused with pieces of shatter.

Research value: The presence of large numbers of tabular pieces would indicate the location of extensive tool manufacture, or the point at which chipped-stone raw material entered the community (a quarry site).

Utilized Tabular Pieces (405)

Definition: The morphological characteristics are the same as those for unmodified tabular pieces, except for the addition of discernible wear along the tool margins. Retouch is either lacking or occurs along less than one cm of the tool margin.

Potential errors: These may be confused with unmodified tabular pieces.

Research value: A large number would indicate intensive use of available raw material.

Unmodified Cores (450)

Definition: Any piece of chert which has a discernible striking platform and systematic alignment of cleavage scars on the various faces.

Potential errors: These may be confused with pieces of shatter.

Cultural-Historical position: Cores may be further divided into 'block' and 'blade' cores. Block cores were used in the production of irregularly shaped flake blanks while blade cores were used in the production of regularly shaped blades, or flakes which are at least two times longer than they are wide, along the axis of percussion. In the Kansas City locality, block cores are associated with all prehistoric complexes while blade cores are most frequently associated with the Kansas City Hopewell Complex.

Research value: Since the potential for production of flake blanks is not yet exhausted, their presence may represent storage of raw material (House 1975:65).

Utilized Cores (455)

Definition: The morphological characteristics are the same as those for unmodified cores, except for the addition of discernible wear along

the tool margins. Retouch is either lacking or occurs along less than one cm of the tool margin.

Potential errors: These may be confused with unmodified cores.

Research value: A large number would indicate the location of stone tool manufacture and optimum use of available raw materials.

Modified Blanks

The classes defined under modified blanks include specimens which may be marginally or invasively retouched. It is stipulated in the definition for each tool type whether it includes marginal or invasive modification. Invasive modification is defined as the byproduct of flake removal originating from the lateral edges, and extending more than one-half way across the dorsal and ventral faces of the blank. Marginal modification is defined as the byproduct of flake removal originating from the lateral edges, and extending less than one-half way across the dorsal or ventral faces of the blank. Modification must also occur along at least one cm of the tool margin for both invasive and marginal modification.

Modified Chips (110)

Definition: Any piece of chert removed from a larger mass by the application of force and which is less than or equal to two cm along the axis of percussion. A portion of the chip must have at least one of the following: 1. striking platform remnant; 2. bulb of percussion; 3. compression rings; or, 4. a hinge fracture.

Potential errors: These may be confused with broken, modified flakes.

Cultural-historical position: These are most frequently associated with Late Woodland and later periods.

Research value: The presence of a large number indicates a micro tool assemblage with probable use of pressure flaking techniques.

Modified Flakes (320)

Definition: Any piece of chert removed from a larger mass by the application of force and which is greater than two cm along the axis of percussion. A portion of the flake must have at least one of the following: 1. striking platfrm remnant; 2. bulb of percussion; 3. compression rings; or, 4. a hinge fracture. Flakes may be retouched invasively but are most often marginally modified.

Research value: The presence of a large number may indicate the maximum use of available raw material.

Modified Shatter (210)

Definition: Any piece of chert which is cubical or irregularly shaped, and lacks a well-defined striking platform or systematic alignment of cleavage scars on the various faces. Shatter is always marginally modified.

Potential errors: These may be confused with modified cores.

Research value: The presence of a large number would indicate maximum use of available raw materials.

Modified Tabular Pieces (410)

Definition: A large block of chert with at least one lateral edge consisting of a natural surface rather than a trimmed edge. The intersection of the ventral, lateral and dorsal surfaces tend to be at right angles to each other. Tabular pieces are always marginally modified.

Modified Cores (450)

Definition: Any piece of chert which has a recognizable striking platform and systematic alignment of cleavage scars on the various faces. Modified cores are usually marginally retouched.

Potential errors: These may be confused with shatter.

Research value: The presence of a large number, compared to unmodified cores, would indicate maximum use of available raw material.

End Scrapers (500)

Definition: A flake or chip which has been marginally or invasively modified on one face to produce a regularly shaped, straight to convex, working end which is transverse to the axis of percussion.

Potential errors: These may be confused with modified chips and flakes.

Research value: These were probably specialized maintenance tools.

Side Scrapers (510)

Definition: A flake or chip marginally or invasively modified on one face to produce a regularly shaped, straight to convex working edge on either one or both lateral edges. Retouch must be parallel with the axis of percussion.

Potential errors: These may be confused with modified chips and flakes.

Research value: These are probably specialized maintenance tools.

Disto-Lateral Scrapers (520)

Definition: A flake or chip marginally or invasively retouched on one face to produce a regularly shaped, straight to convex working edge on one of the lateral edges and one end. Retouch must be both parallel and transverse to the axis of percussion.

Potential errors: These may be confused with modified chips and flakes.

Research value: Disto-lateral scrapers probably represent specialized tools for maintenance activities.

Perforators (600)

Definition: A flake or unidentifiable blank with marginal or invasive modification producing a pronounced, often rounded, protrusion on the end of the flake.

Potential errors: Recognition of this class is usually easy.

Research value: Perforators are often produced from broken projectile points and knives. They are often the product of stone tool rejuvenation.

Gravers (610)

Definition: A flake, chip, or shatter with marginal modification to produce a pronounced, sharp, angular protrusion on the tool margin.

Potential errors: Recognition of this class is usually easy.

Research value: These are probably specialized tool forms for maintenance tasks.

Notches (700)

Definition: A flake, chip, shatter or tabular piece with marginal modification to produce a single, concave notch along the tool margin.

Potential errors: These may be confused with denticulates.

Research value: These are a specialized tool form probably used in maintenance tasks.

Denticulates (710)

Definition: A flake or chip with marginal modification to produce two or more contiguous notches along any edge of the blank. Modification may be discontinuous.

Potential errors: These are easily recognized.

Research value: These are probably a specialized tool form used in procurement and maintenance tasks.

Micro Preforms and Knives (800)

Definition: A flake, chip or unidentifiable blank which has marginal or invasive modification on one or both faces. There is no well-defined working edge and/or area of utilization. Modification is often produced by pressure flaking. Micro preforms and knives are less than 6.1 mm in maximum thickness.

Potential errors: Recognition of this class is usually easy.

Cultural-historical position: These are most frequently associated with prehistoric complexes dating after A.D. 500.

Research value: These are probably preforms for projectile points or are generalized knife forms.

Micro, Unnotched Projectile Points (810)

Definition: A flake, chip or unidentifiable blank which has marginal or invasive modification on one or both faces. The form is triangular with a well defined working edge and hafting element. Micro projectile points are less than 6.1 mm in maximum thickness.

Potential errors: These may be confused with micro preforms.

Cultural-historical position: These are associated with prehistoric complexes dating after A.D. 500.

Research value: These probably represent the use of the bow-and-arrow for procurement tasks.

Micro, Notched Projectile Points (820)

Definition: A flake, chip or unidentifiable blank with continuous, marginal or invasive modification on one or both faces to produce a triangular form with a well defined working edge and hafting element. Modification was produced by pressure flaking. The hafting element may consist of side notches, corner notches, stems and/or basal notches. These are less than 6.1 mm in maximum thickness.

Potential errors: This class is usually easily recognized.

Cultural-historical position: These are associated with prehistoric complexes dating after A.D. 500.

Research value: These probably represent the use of the bow-and-arrow for procurement and defense activities. The type and placement of notches are useful in stylistic studies.

Light Duty Preforms and Knives (860)

Definition: A flake or unidentifiable blank with continuous, marginal or invasive modification on one or both faces. Well defined working edges and/or areas of utilization are absent. Light duty preforms and knives are between 6.1 and 12 mm in maximum thickness.

Potential errors: Recognition of this class is usually easy.

Research value: These may represent unfinished dart or spear points and/or general knife forms.

Light Duty, Specialized Tools (870)

Definition: A flake or unidentifiable blank which has continuous, marginal or invasive modification on one or both faces. These are varied in form, including lanceolate, rectangular, ovate and triangular outlines, and well defined working edges. Light duty, specialized tools are between 6.1 and 12 mm in maximum thickness.

Potential errors: These may be confused with light duty preforms and knives.

Research value: Light duty tools probably indicate generalized maintenance activities.

Light Duty Projectile Points (880)

Definition: A flake or unidentifiable blank which has continuous, marginal or invasive modification on one or both faces, producing a triangluar or lanceolate form with a well defined working edge and hafting element. Stems, side, corner or basal notches are present. These tools are between 6.1 and 12 mm in maximum thickness.

Potential errors: This class is easily recognized.

Cultural-historical position: These are most frequently associated with prehistoric complexes dating before A.D. 500.

Research value: These probably indicate specialized procurement and maintenance activities.

Heavy Duty Preforms (900)

Definition: An unidentifiable blank or tabular piece which has marginal or invasive modification on one or both faces. These have a regularly shaped form but lack a well defined working edge. Heavy duty preforms are greater than 12 mm in maximum thickness.

Potential errors: This class may be confused with cores.

Research value: These probably represent unfinished chopping and cutting tools.

Heavy Duty, Unspecialized Tools (910)

Definition: A tabular piece or unidentifiable blank which has continuous, marginal or invasive modification on one or both faces. These are regularly shaped forms with well defined working edges and/or areas of utilization. Heavy duty, unspecialized tools are greater than 12 mm in maximum thickness.

Potential errors: This class is usually easily recognized.

Research value: These represent a wide range of generalized tools used in procurement and maintenance activities.

Heavy Duty, Specialized Tools (920)

Definition: A tabular piece or unidentifiable blank which has continuous, marginal or invasive modification on one or both faces. These have a regular shape with a well defined working edge and/or area of

utilization. This class consists of tools more commonly referred to as adzes, hoes and axes.

Potential errors: These may be confused with unspecialized, heavy duty tools.

Research value: The different forms allow inferences about specialized procurement and maintenance tasks.

Composite Tools (950)

Definition: A flake, chip, shatter, tabular piece, core or unidentifiable blank which has continuous or discontinuous retouch to produce two or more working edges which are distinct from each other. The combination of a 'notch' on a 'modified flake' is an example.

Potential errors: This class is usually easily recognized.

Research value: These represent multi-function tools with specialized forms of working edges associated together on one blank. The occurrence of a large number of these tools suggest maximum use of raw materials. Composite tools would be best suited to a nomadic existence, reducing the quantity of specialized tools produced on separate blanks (Hofman 1973:8).

Table 2.3 lists the attributes recorded for the morphological classification system. The attributes were recorded on IBM computer cards. Length measurements are to the nearest mm, weights are to the nearest gram. Each artifact was recorded on a separate set of cards.

Ground and Pecked Stone Tools

Hammerstones (1000)

Definition: Rounded pieces of chert or quartzite with well defined areas of battering on prominent corners.

Potential errors: These may be confused with cores and shatter since the latter were often recycled as hammerstones.

Research value: The presence of these at a site suggests flaking and production of chipped-stone tools. These should be associated with waste debris from stone tool manufacture.

Ground Stone Axes (1010)

Definition: A ground or pecked tool with a sharp bit. A groove around the opposite end of the butt may be present, making it a grooved axe.

Potential errors: These are easily identified.

Cultural-historical position: Grooved axes are associated with complexes in wooded environs dating after the Middle Archaic (Griffin 1955:33).

Research value: Grooved axes suggest the cutting of wood.

Abraders (1020)

Definition: Any small piece of stone, usually sandstone, with a smooth or grooved abrading surface.

Potential errors: Plow scars may be mistaken for grooved abraders.

Research value: Abraders were used to smooth wood and bone tools. They represent general maintenance tasks.

Table 2.3

Attributes recorded for the morphological and technological typology.

Card 1

Column	
1-10	artifact catalogue number
11	marginally modified tool
12	invasively modified tool
13-15	tool category code
20	local chert
21	exotic or non local chert
22	artifact produced from bedded chert
23	artifact produced from a pebble
26	discoloration of chert due to heat
27	chert cracked by heat
34	cortex present only on a portion of the dorsal surface of the blank
35	cortex present on a total dorsal surface of the blank
	Artifact Condition
41	complete
42	base
43	midfragment
44	tip
45	indeterminate
	Blank Type
46	tabloid
47	flake or chip
48	blade
49	indeterminate
	Tool Size
50-52	length along axis of percussion
53-55	width perpendicular to axis of percussion
56-58	thickness
59-61	weight

Card 2

Column	
1-10	artifact catalogue number
12	platform remnant obliterated
13-15	platform width
16-18	platform thickness
23-25	platform angle (ventral face)
33	dorsal reduction present
34	platform reduction present
35	grinding present
36	lip present
37	eraillure present

Hematite (1030)

Definition: Pieces of the mineral hematite. This does not include worked hematite, such as tools or ornaments.

Research value: Hematite was probably used as a red pigment in paint.

Metates (1040)

Definition: A piece of stone, usually sandstone or limestone, which has a basin shape on one or both faces produced from abrading activities.

Research value: Metates were probably used in a number of tasks such as the production or preparation of food from nuts and seeds and the grinding of hematite. They may have also been used in the crushing of stone, pottery, shell or bone for use as tempering in the manufacture of pottery.

Manos (1050)

Definition: A fist-size cobble with well-defined abrasion on one or more surfaces. The abraded surfaces tend to be flat or slightly convex.

Potential errors: Manos may be confused with hammerstones.

Research value: Manos were used in conjuction with metates.

Nutting Stones (1060)

Definition: A piece of stone, usually sandstone or limestone, which has well-defined pecked depressions. The depressions are approximately 25 mm in diameter and oftentimes occur in clusters.

Potental errors: These are easily recognized.

Research value: These were probably used in the hulling of nuts, and also possibly for processing hematite for paint.

Limestone (1070)

Definition: Any piece of burned or unburned limestone. This does not include worked limestone.

Potential errors: These are easily recognized. A solution of dilute hydrochloric acid causes a reaction.

Research value: Limestone may have been used for boiling stones in cooking tasks, as weights to hold down skin shelter coverings, or more likely, in the building of cooking hearths and ovens.

Unworked Stone (1080)

Definition: All other unworked stone, usually sandstone, granite or quartzite.

Potential errors: These are easily recognized.

Research value: These may have been used as boiling stones (Russell 1963:58-60), or they may represent the storage of raw material to be later ground up to temper pottery.

Burned Earth (1090)

Definition: Any piece of earth which has been exposed to extreme heat to fire-harden the soil. Tempering material is absent.

Potential errors: These are easily recognized.

Research value: Burned earth is often associated with fire hearths and possible house structures.

Pottery (1100)

Definition: Any piece of clay which has been intentionally tempered and/or formed to a regular shape and which has been exposed to extreme heat to fire the clay.

Potential errors: These are easily recognized.

Cultural-historical position: Fiber-tempered pottery is associated with the Nebo Hill Complex (Reid 1978). Grit tempered pottery with various styles of rims on conical vessels can be assigned to the Kansas City Hopewell complex (Johnson and Johnson 1975; Wedel 1943). Grit and grog tempered pottery with vertical cordmarking is assignable to the Late Woodland period. Pottery tempered with shell and with plain or incised exterior surfaces can be assigned to the Steed Kisker Complex (Wedel 1943). Shell-tempered pottery with cordmarking pertains to the Maybrook Complex.

Research value: Pottery decoration and vessel form are good temporal markers.

Faunal Remains (1110)

Definition: Piece of bone or shell, the remains of once living animals.

Potential errors: These are easily recognized.

Cultural-historical position: Certain species of animals may have been more abundant during different time periods. Some forms of animals, associated with the Paleo-Indian period, are now extinct.

Research value: Prehistoric subsistence strategies, season of occupation and past environmental conditions may be obtained from the study of faunal remains.

Charred Seeds (1111)

Definition: Any piece of carbonized nut fragment or plant seed.

Potential errors: Some seeds, due to their small size and color, may not be charred. A botanist with a knowledge of the local flora is essential in identifying charred seed remains.

Research value: Prehistoric subsistence strategies, season of occupation and past environmental conditions can be obtained from floral remains.

Functional Classification System for Chipped Stone Tools

Function includes how an artifact was used and how it indirectly reflects activities which were part of the on-going cultural situation in which it was manipulated. This deviates from Sackett's definition (1973: 320) in not including technology, or how an artifact was made. Technology is viewed as a means to an end. There are alternative ways of achieving the same end, which are better reflected in artifact morphology (Bordes 1971:212) rather than tool function.

One of the advantages in developing a functional typology is the potential of differentiating between different activities in intra-site studies. The use of morphological typologies is not ideally suited to intra-site activity studies. Since form does not always conform to function, different activities may be present within a site but not discernible using a typology based upon morphology.

The development of functional typologies has traditionally been based upon three avenues of research: 1. ethnographic analogy; 2. repli-

cative experiments; and, 3. microwear studies. These will be discussed individually.

Replicative Studies

The study of wear patterns on stone tools was brought into the forefront of archeology by the English publication of Prehistoric Technology by S.A. Semenov (1964). As with most studies involving new ideas and procedures, Semenov's work will be remembered in this respect rather than for the conclusions concerning Palaeolithic tool use. To grasp the variability of wear occurring on stone tools, replicative experiments are an integral part of a functional analysis. The size, shape, flaking characteristics and hardness of raw materials have a definite effect on the type of wear resulting from a particular mode of use (Goodman 1944: 417). Another purpose of replicative experiments is to yield the function of a tool, of a given form, with a given degree of probability. And conversely, replicative experiments might suggest what a tool form could not likely have been used for (Sonnenfeld 1962:60).

Replicative experiments can be divided into two groups. First, studies performed to determine the feasibility of creating an object by use of stone tools, and second, studies performed to determine wear patterns resulting from different modes of use. One of the earliest published studies of the first kind is by J. R. Moir (1926:655-656). He used chipped stone tools to cut and work wood. Swauger and Wallace (1964:1-7) experimented with Palaeolithic and Neolithic stone implements which had been classified according to morphological attributes. Results of cutting, chopping and scraping activities suggested some of the type names such as 'chopper', 'hand axe', 'scraper' and 'knife' did not relate to the use of the tools, as they were unwieldy in these functions.

Don Crabtree (1966; 1967a; 1967b; 1968a; 1968b; 1970; 1972; 1973a; 1973b; Crabtree and Swanson 1968; Bordes and Crabtree 1969) has published numerous studies on duplicating and using stone tools. Concerning the topic of wear patterns, Crabtree (1973a:46-52) states that due to the durability of stone and the amount of use and abuse required to develop discernible wear, traces of wear must be approached with caution since many tools may have been used for tasks and discarded before acquiring discernible wear. Other studies replicating tasks using stone tools include the work of Sollberger (1969), Sheets (1973), and Dickson (1972).

Studies designed to examine the wear resulting from particular modes of use include the work of Keller (1966), Howard (1973), Tringham et al. (1974), Lynott (1975), MacGregor (1975), Keeley and Newcomer (1977), Hester, Spencer, Busby and Bard (1976), Curwen (1930; 1935), Hayden and Kamminga (1973), Spurrell (1892), Sonnenfeld (1962), Coutts (1977), Walker (1978), Toll (1978), Ranere (1975) and Frison (1978).

Stone tools imbedded in faunal remains and human skeletal remains recovered from prehistoric sites are probably the most reliable indicators of stone tool function. The disadvantage of stone tools directly associated (imbedded) with faunal remains is the limited functions involved, the penetration and killing of the animals. The most rewarding and intriguing consequences of such remains are the variability in the morphology of projectiles. As examples, arrow points imbedded in two prehistoric human skulls from California and Illinois would be typed as 'perforators' or 'drills' in most morphological typologies (Wilson 1901: 517-518).

Site 117, a Nubian Palaeolithic graveyard in the Sudan (Wendorf 1968: 954-995) is one of the most interesting sites. In this instance one function apparently could be fulfilled by a wide range of morphological tool types. Apparently, any pointed, thin flake could be used as a projectile point. Modification was not required. Artifacts imbedded in the human skeletal remains included chips, flakes, backed flakes, retouched flakes, microblades, burins and projectile points (Wendorf 1968: 982). This assemblage of morphological tool types occurring in the undisputable association of a projectile function supports the contention that two classification systems, based upon style and function, are necessary for deriving the full potential from assemblages.

Ethnographic Studies

Ethnographic accounts of the use of stone implements by groups of people using a stone tool technology allows one to make, with caution, analogies. Early accounts of the use of material culture by living peoples were an attempt to preserve the 'traditional' lifeways of those peoples. These observational records are not ideally suited to the reconstruction of prehistoric tool use; however, some have proved more useful than others, including the following studies of North American Indians: Heizer (1954), Barrett (1952), Wissler (1910;1917), Skinner (1921), Sellers (1886), Mason (1887), Eyman (1968), Birket-Smith (1958), Holmes (1919), Fletcher and La Flesche (1911), Barrett and Gifford (1933), Stefansson (1914), Lowie (1909), Hodge (1928) and Leidy (1872).

Archaeological Specimens

In addition to the use of stone tools as depicted in ethnographic accounts, archaeological specimens recovered from dry environments, such as caves, often have the full configuration of the aboriginal tools, i.e. stone tools still hafted to perishable materials such as wood and bone (Harrington 1942; 1952; 1959; Hester 1974; Rozaire 1962; Strong 1945; Hodge 1930; Krieger 1956b; Wilson 1901).

Analysis

The most successful functional studies have been those using edge angles and configuration of microwear (Jelinek 1976:27). The typology developed in the present study uses different forms of wear and the placement of the wear around the edge of tools. These attributes were recorded on a polar coordinate grid which was divided into 12 equal parts, each part representing 30° of the full circle (Fig. 2.3). Artifacts were orientated on the polar grid in the following manner:

1. If the axis of percussion was discernible, the artifact's axis of percussion was orientated on the 0° -180° line, with the striking platform remnant placed at the bottom. The ventral face was placed facing down.

2. If the axis of percussion was obliterated by modification, the artifact was placed in such a manner so that the longest dimension was centered on the 0° - 180° line and the widest end placed at the bottom. If the ventral face was not discernible then the flattest face was placed facing down.

3. Fragmentary artifacts were orientated as described above, not taking into consideration those portions which were missing.

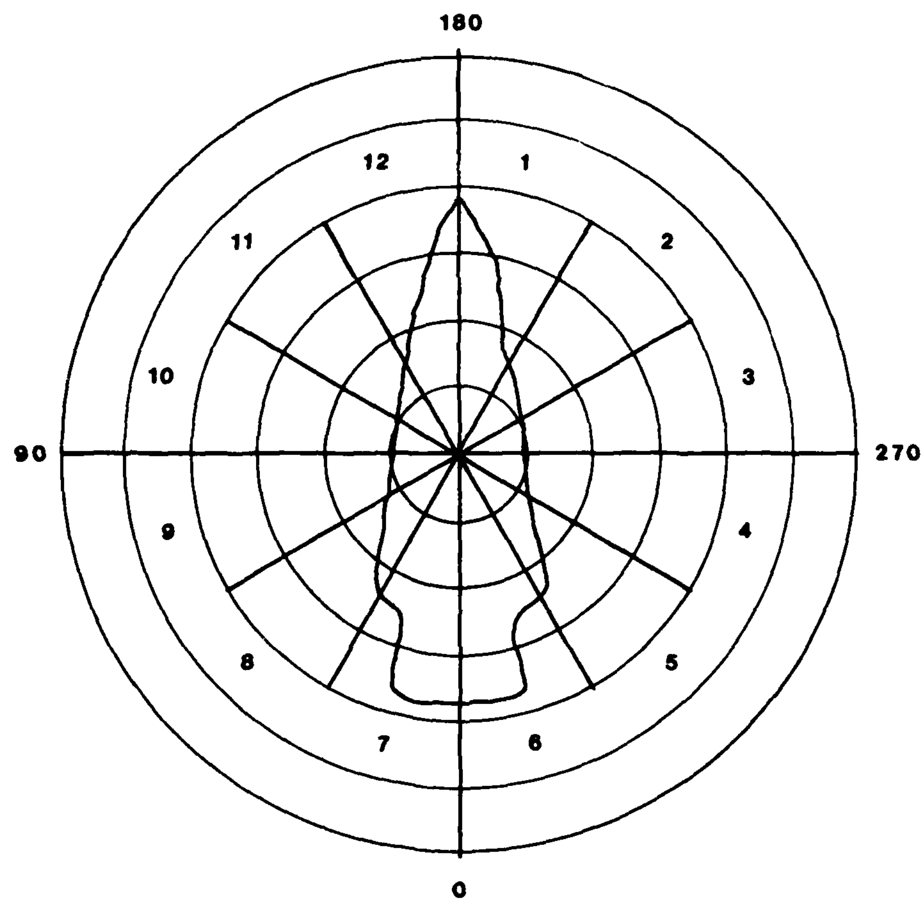


Figure 2.3 Polar grid illustration showing the 12 segments used for recording placement of retouch and wear.

After the artifacts were traced on the polar coordinate grid, edge wear was recorded on the grid. The artifact edges were examined with use of a Bausch and Lomb binocular microscope with magnification of 7X to 30X. The placement and configuration of wear was recorded according to the 12 segments on the polar grid. If a particular wear configuration occurred in an arc greater than or equal to 10° within a segment then it was recorded as occurring within that segment. Inversely, if a particular wear occurred in an arc less than 10° within a segment then it was not considered to be present within that segment. Five configurations of wear were recorded: sickle gloss, edge rounding, edge crushing, step faceting, and fractures.

Sickle Gloss

Definition: Historically, sickle gloss has been one of the easiest forms of artifact wear to recognize. The characteristics of sickle gloss were recognized as early as 1892 by Robert Munro (1892: 164-175 and F.C. Spurrell (1892:53-69). E. C. Curwen (1930:179-186; 1935:62-66) studied the characteristics of sickle gloss. One study concerning sickle gloss was by John Witthoft (1967:383-388). He states sickle gloss is an accumulative process, rather than the abrasive one which is characteristic of most other forms of artifict wear. Sickle gloss is an accumulation of noncryptalline opal. This form of wear can only be acquired by tool use on vegetal matter containing noncryptalline opal, such as grass.

Potential errors: Sickle gloss may be confused with edge rounding.

Research value: Sickle gloss is most often associated with tools used in agriculture.

Edge Rounding

Definition: This configuration of wear consists of edge abrasion resulting in a smoothed or polished surface. The more prominent areas along a working edge are most likely to be smoothed. Edge rounding has been recognized, replicated and described in a number of studies (Ahler 1970; Semenov 1964; Keeley and Newcomer 1977).

Potential errors: This is easily recognized.

Research value: Edge rounding is the result of working soft and medium hard materials such as hides, meat and green wood.

Edge Crushing

Definition: This configuration of wear consists of edge abrasion resulting in an irregular, angular and fractured edge with compound, minute scalar flake scars. The crushing is often associated with edge rounding. This form of wear has been identified, replicated and described in a number of studies (Semenov 1964: Ahler 1970; Keeley and Newcomer 1977; Hester, Spencer, Busby and Bard 1976; Tringham et al. 1974; Keller 1966).

Potential errors: This may be confused with step-faceting. Edge crushing may be due to edge grinding for the preparation of flake removal in tool manufacture.

Research value: Crushing is the result of working medium hard and hard materials such as green wood and bone.

Step Flaking

Definition: This configuration of wear is characterized by flake scars that are wider than they are long and that terminate in a stepped fracture. These step flakes are often compounded, one overlapping the

next. Step flaking has been recognized, recorded and described in a number of studies (Semenov 1964; Ahler 1970; Keeley and Newcomer 1977; Tringham et al. 1974; Keller 1966).

Potential errors: Extensive step-flaking may be confused with edge crushing. The presence of some step-flaking may be a result of edge modification.

Research value: Step flaking is the result of working hard materials, such as dry wood and bone.

Fractures

Definition: Fractures are longitudinal, transverse and diagonal breaks on tools.

Potential errors: Fractures are easy to recognize.

Research value: Fractures may be the result of several forms of use or abuse: 1. breakage during manufacture (Lenoir 1975); 2. heat fracture (Purdy 1971; 1974; 1975; Crabtree and Butler 1964; Mandeville and Flenniken 1974; Collins and Fenwick 1974; Hester and Collins 1974; Hester 1972; 1973; Shippee 1963); 3. direct impact fracture (Purdy 1975:34-35; Tsirk 1979:84); and, 4. impact fracture associated with projectile points which have hit hard materials (Ahler 1970:85-86).

Edge Angles

Excellent studies of edge angles as they relate to tool function are those of Wilmsen (1968a; 1968b; 1970). He has inferred that cutting operations are performed with tools having acute edge angles between 26° - 35°. Edge angles between 46° - 55° are suitable for a number of functional applications. These could be used for skinning and hide preparation, plant-fiber shredding, cutting bone or horn or maybe tool back-blunting. Steeper angles of 66° - 75° are best suited for wood and bone working, skin softening and heavy shredding.

In this study two different edge angles were measured with a goniometer to the nearest 5°. The natural edge angle is defined as the angle at which the most invasive flake scars converge at the working edge (Fig. 2.4). The retouch angle is the angle in which the most marginal flake scars converge at the working edge (Fig. 2.4). The process of retouching produces steeper angles. This process allows for the morphology as well as the function of a tool to change through time by a process of attrition, rejuvenation and recycling.

Five different raw material types were recorded. Three of the chert types, Winterset, Westerville, and Argentine, are locally available. Burlington chert is often recorded, its nearest source is Saline County, Missouri (Meek 1873). Other chert types, for which the source is unknown, are referred to as 'non-local'.

The functional typology was patterned on a hierarchical structure. It must be emphasized that the classes of tools derived within the hierarchical structure are based upon probable function as inferred from ethnographic accounts, replicative studies, microwear studies and complete archaeological specimens. The variability in the lithic artifacts recovered from the sites made it necessary to develop generalized classes of artifacts. Examples include 'soft cutting', 'medium cutting' and 'hard cutting'.

Wear that occurred on the 'distal' and/or proximal edge of a tool was defined as occurring in any two of the following segments of the polar grid (Fig. 2.3): 1, 2, 11, 12 and/or 5, 6, 7, 8. Wear that occurred on the 'lateral' or medial edge of a tool was defined as occurring

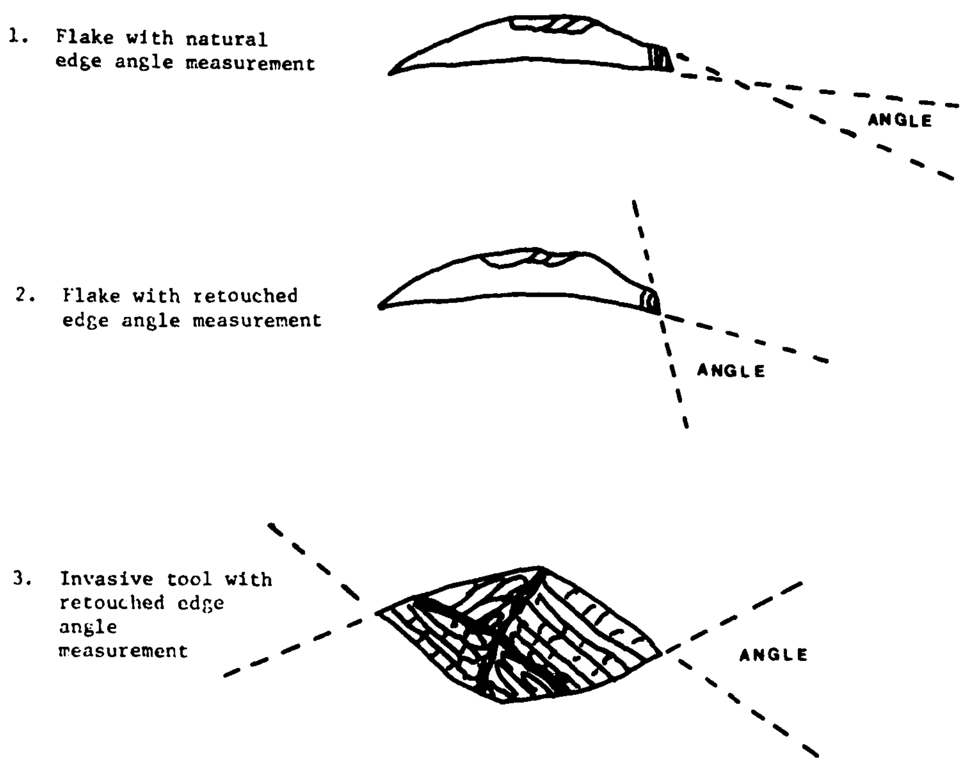


Figure 2.4 Method of measuring the natural and retouched edge angles on chipped stone tools.

in any three of the following segments (Fig. 2.3): 1, 2, 3, 4, 5, 6, or 7, 8, 9, 10, 11, 12. Wear occurring on the 'disto-lateral or total tool margin was defined as being any combination of 'distal' wear and 'lateral' wear and/or any ten segments of the grid.

Inferred Function

Soft Cutting

Definition: These tools were defined by the presence of rounding on both the dorsal and ventral faces of the working edge. These tools were used in cutting relatively soft materials.

Medium Cutting

Definition: These tools have rounding in conjuction with crushing on both the dorsal and ventral faces of the working edge. These tools were probably used in cutting soft to medium hard materials.

Hard Cutting

Definition: These tools have crushing and/or step flaking on both the dorsal and ventral surfaces of the working edge. These tools were used in cutting medium hard and hard materials. These could definitely not have been used in hide or meat cutting tasks (Tringham et al. 1974:191).

Soft Scraping

Definition: These tools have rounding on either the dorsal or ventral surface of the working edge. These were used in scraping soft materials.

Medium Scraping

Definition: These tools have rounding and crushing on either the dorsal or ventral faces of the working edge. Rounding may be present on both faces of the working edge. These tools were used in scraping medium hard and soft materials.

Hard Scraping

Definition: These tools have crushing and/or step flaking on either the dorsal or ventral surfaces of the working edge. These were used in scraping medium hard and hard materials.

No Wear

Definition: This is the absence of discernible wear on the tool margins. The lack of wear may be attributable to any one or a combination of the following: 1. unfinished tools which were never used; 2. tools which have been rejuvenated; or, 3. tools used for only a short duration so as not to acquire discernible wear. It should be emphasized that the wear configurations used in this study are not directly comparable to more elaborate high-powered microscopic studies.

The functional typology and recorded attributes are presented in Figure 2.5 and Table 2.4. The mechanism used to articulate the results of the two typologies is a crosstable, with tool morphology on the vertical axis and tool function on the horizontal axis. This procedure allows the necessary inclusion of tool morphology as it relates to function. Each combination of tool form and function results in a probable activity in which a tool was employed.

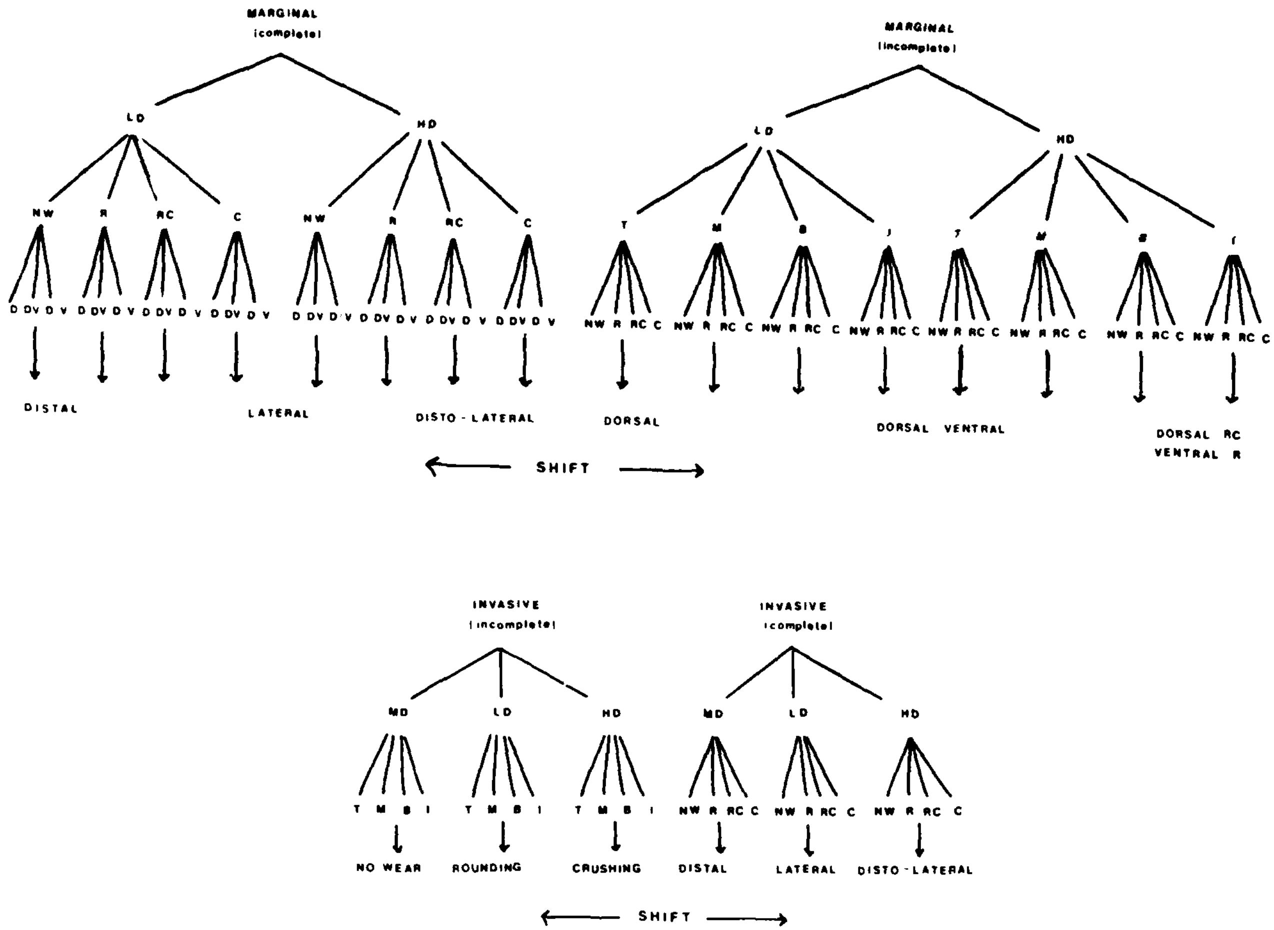


Figure 2.5 Functional hierarchical structure for chipped stone tools.

Key to the functional hierarchical structure in Figure 2.5.

MD	micro duty
LD	light duty
HD	heavy duty
NW	no wear
R	rounding
RC	rounding and crushing
C	crushing
T	tip
M	midfragment
B	base
I	indeterminate
D	dorsal
DV	dorsal and ventral
D/V	dorsal crushing and ventral rounding

Table 2.4

Attributes recorded for the functional typology.

Card 3	
Column	
1-12	artifact catalogue number
13-24	placement of sickle gloss
25-36	placement of edge rounding
37-48	placement of edge crushing
49-60	placement of edge step-flaking
61-72	placement of fractures

Card 4	
1-12	artifact catalogue number
13-24	placement of retouch
37	presence of sickle gloss on dorsal surface
38	presence of rounding on dorsal surface
39	presence of crushing on dorsal surface
40	presence of step flaking on dorsal surface
41	presence of sickle gloss on ventral surface
42	presence of rounding on ventral surface
43	presence of crushing on ventral surface
44	presence of step flaking on ventral surface
45	presence of sickle gloss on tool margin
46	presence of rounding on tool margin
47	presence of crushing on tool margin
48	presence of step flaking on tool margin
49	presence of sickle gloss on tool face
50	presence of rounding on tool face
51	presence of crushing on tool face
52	presence of step flaking on tool face
53-55	natural edge angle
56-58	retouch edge angle
59	Winterset chert
60	Westerville chert
61	Argentine chert
64	Burlington chert
72	exotic chert

Pottery Attributes and Analyses

Twenty-nine attributes were recorded for the pottery recovered from excavations. Due to the fragmentary nature of the sherds, only those complete enough to measure maximum sherd thickness and core color were included in the pottery analyses. Eight of the above attributes are continuous measurements, 21 are discrete. In this report, attributes are defined as descriptive properties of artifacts (Krieger 1956a:145). Some attributes are recognized as cultural modes, while others are related to biology, chemistry, and physics. Each mode is defined as a single attribute worthy of historical study (Rouse 1939:12; 1960:313-314).

The sherds were sorted into three groups: 1. those with plain exterior surface treatment; 2. those with cordmarked or decorated exterior surfaces; and, 3. rim sherds. Attributes recorded for the pottery are shown in Table 2.5. All data were recorded on standard, 80 column, IBM computer cards.

Definitions of the Attributes

Temper Type

Definition: This attribute consists of a list of possible materials used to temper pottery. Freshly broken edges of sherds were examined with the aid of a Bausch and Lomb binocular microscope at 7X to 30X.

Potential errors: The correct identification of temper by means of a binocular microscope was not always possible. Petrographic analysis of a sample of 11 sherds from the Sperry site, 23JA85 (See Brown, this volume), indicates the inability to always discern the presence of sherd tempering. In this report, it is believed that, with the probable under-identification of the presence of sherd tempering, all other forms of tempering materials are correctly identified.

Research value: The type of tempering in association with exterior surface treatment and vessel form are valuable temporal indicators.

Temper Size and Quantity

Definition: This is measured by means of comparing a freshly broken sherd edge with a bricket which has a specified proportion and size of temper. The temper contents of the brickets are by weight.

Potential errors: This attribute is usually easily recognized.

Research value: The size and quantity of temper in clay allows determination of the amount of aplastic material added to make pottery vessels.

Natural Paste Inclusion

Definition: This attribute has the same possible materials as does temper type. Sand, hematite and indurated clay are the most common inclusions.

Potential errors: The presence of indurated clay may be under-recorded due to the limitations of using a binocular microscope.

Research value: The identification of natural paste inclusions may allow determination of the source of the clay used to make pottery vessels.

Slip Color

Definition: This is the color of a slip using the closest Munsell color chip (1975 edition) presented in Table 2.5.

Table 2.5

Attributes Recorded for Pottery

Coding System: Card One

Column	
1- 8	Catalog number
9-11	Item number
12-13	Temper type 1. Indeterminate 2. Absent 3. Fiber 4. Sand 5. Grit (unidentified crushed rock) 6. Sherd 7. Limestone 8. Bone 9. Shell 10. Crushed granite 11. Crushed calcite 12. Grit and sand 13. Hematite 14. Sand and sherd 15. Grit and shell 16. Indurated clay
14-15	Temper size and quantity

	size (mm)	percent
1.	x .LT. 1.0	10%
2.	x .LT. 1.0	20%
3.	x .LT. 1.0	30%
4.	x .LT. 1.0	40%
5.	x .LT. 1.0	50%
6.	1.0 .LT. x .LT. 2.0	10%
7.	1.0 .LT. x .LT. 2.0	20%
8.	1.0 .LT. x .LT. 2.0	30%
9.	1.0 .LT. x .LT. 2.0	40%
10.	1.0 .LT. x .LT. 2.0	50%
11.	2.0 .LT. x .LT. 3.3	10%
12.	2.0 .LT. x .LT. 3.3	20%
13.	2.0 .LT. x .LT. 3.3	30%
14.	2.0 .LT. x .LT. 3.3	40%
15.	2.0 .LT. x .LT. 3.3	50%
16.	0.0 .LT. x .LT. 4.0	10%
17.	0.0 .LT. x .LT. 4.0	20%
18.	0.0 .LT. x .LT. 4.0	30%
19.	0.0 .LT. x .LT. 4.0	40%
20.	0.0 .LT. x .LT. 4.0	50%

16-17	Natural Paste Inclusions (see temper type above)

Table 2.5 cont'd.

Coding System: Card One cont'd.

18-19 Slip Color

1. Absent
2. 7.5YR 7/4 pink
3. 7.5YR 6/4 light brown
4. 7.5YR 5/0 gray
5. 7.5YR 4/0 dark gray
6. 7.5YR 3/0 very dark gray
7. 7.5YR 2/0 black
8. 10YR 8/6 yellow
9. 10YR 7/4 very pale brown
10. 10YR 6/3 pale brown
11. 10YR 5/2 grayish brown
12. 10YR 4/1 dark gray
13. 10YR 3/1 very dark gray
14. 10YR 2/1 black

20-21 Exterior Paste Color (see slip color above)

22-23 Interior Paste Color (see slip color above)

24-25 Core Color (see slip color above)

26-27 Carbon Streak

1. Indeterminate
2. Absent
3. Present

28-29 Finishing

1. Indeterminate
2. Paddle-and-anvil
3. Scrape

30-31 Exterior Surface Treatment

1. Indeterminate
2. Floated
3. Polished
4. Slipped
5. Slipped and polished
6. Cordmarked
7. Brushed
8. Simple stamped
9. Check stamped
10. Cordmarked and slipped
11. Slipped and cordmarked

32-33 Interior Surface Treatment (use exterior surface treatment code)

34-35 Smoothing Over Exterior Surface Treatment

1. Indeterminate
2. Absent
3. Present

Table 2.5 cont'd.

Coding System: Card One cont'd.

36-37 Smoothing Over Interior Surface Treatment
1. Indeterminate
2. Absent
3. Present

Coding System: Card Two

Column

1- 8 Catalog Number

9-11 Item number

12-15 Randformen-Kombinationstabelle number
1. Indeterminate
2. Absent

16-17 Collar
1. Indeterminate
2. Absent
3. Present

18-19 Lip thickness in mm.

20-21 Rim thickness in mm.

22-23 Rim height in mm.

24-27 Rim diameter in mm (orifice).

28-29 Shoulder thickness in mm.

30-31 Body thickness in mm.

Coding System: Card Three

Column

1- 8 Catalog number

9-11 Item number

12-13 Lip decoration
1. Indeterminate
2. Undecorated
3. Punctated
4. Notched
5. Finger nail impressed
6. Crenated

Table 2.5 cont'd.

Coding System: Card Three cont'd.

14-15	First band element
16	Element orientation
17-18	First band element
19	Element orientation
20-21	First band element
22	Element orientation
23-24	First band motif
25-26	First band width
27-80	Expanded as necessary allowing six columns for the elements for each band, one column for element orientation, two columns for the band motif, and two columns for the width of the band.

Elements Code
1. Indeterminate
2. Undecorated
3. Incisions
4. Cord-impressions
5. Edentate rocker stamping
6. Dentate rocker stamping
7. Dentate stamping
8. Cord-wrapped stick impression
9. Bosses
10. Circular punctates
11. Oval punctates
12. Semilunar punctates
13. Triangular punctates
14. Finger nail impressions
15. Finger pinches
16. Brushing

Element Orientation Code
1. Horizontal
2. Vertical
3. Diagonal (upper right to lower left)
4. Diagonal (upper left to lower right)

Table 2.5 cont'd.

Coding System: Card Three cont'd.

Motifs:
1. Indeterminate
2. Undecorated
3. Horizontal parallel lines
4. Vertical parallel lines
5. Diagonal hatchures (upper right to lower left)
6. Diagonal hatchures (upper left to lower right)
7. Cross hatchures
8. Zig-zag
9. Herringbone
10. Linear repetition of elements(single row)
11. Linear repetition of elements (double row)
12. Linear repetition of elements (triple row)

Coding System: Card Four

Column	
1- 8	Catalog number
9-11	Item number
14-18	Cord diameter on cardmarked potter in .1 mm.
19-23	Cord spacing on cordmarked pottery in 1 mm.
24	Cord twist 1. S twist 2. Z twist
25	Uniform cord spacing 0. No 1. Yes

Potential errors: This is easily recognized.

Research value: Slip color may yield information about the source of clays used to make pottery vessels.

Exterior Paste Color

Definition: This is the color of the exterior surface of sherds. Munsell colors are used as for slip color.

Potential errors: This is easily determined.

Research value: Exterior paste color can lend information as to the relative firing temperature of the sherd.

Interior Paste Color

Definition: This is the color of the interior surface of sherds. Munsell colors used are the same as those for slip color.

Potential errors: This is easily determined.

Research value: Interior paste color can lend information about relative firing temperatures and the use or function of the vessel. The presence of charred organic remains suggests the vessel may have been used in preparing food.

Core Color

Definition: This is the paste color of the center of a sherd. The sherd must have a freshly broken edge to determine color. Munsell colors used are the same as those for slip color.

Potential errors: This is easily determined.

Research value: Dark core colors are an indication of low firing temperatures in a reducing atmosphere. The lack of sufficient oxygen within the fire during vessel firing does not allow the complete oxidation of organic matter inclusions within the clay. This condition causes the organic matter within the clay to become carbonized, creating a dark core color. Light colored cores indicate firing in an oxidizing atmosphere. All organic matter within the clay was oxidized and released into the atmosphere. This leaves little or no residue of carbonized matter within the sherd core (Shepard 1956:217).

Carbon Streak

Definition: The presence of a carbonized layer of organic matter within the core of a sherd. The carbon layer indicates the vessel was fired in a reducing atmosphere. Lack of a carbon streak indicates the vessel was fired in an oxidizing atmosphere.

Potential errors: This is easily determined.

Research value: The presence or absence of a carbon streak lends information about the conditions in which a vessel was fired.

Finishing

Definition: This is the method by which a vessel was given its final form. Paddle-and-anvil is a finishing technique where an anvil is held inside a vessel and a paddle, sometimes wrapped with cordage, is used to strike the exterior surface of the vessel to bind and compress the clay. Scraping is the use of a hard tipped tool to scrape over the exterior and/or interior surfaces of the vessel to give the clay its final shape.

Potential errors: This is usually easy to recognize.

Research value: Determination of finishing allows reconstruction of the methods used to produce pottery vessels. This may lend information which has cultural-historical significance.

Exterior Surface Treatment

Definition: This is the final configuration of a pottery vessel's exterior surface. In this report 10 discernible configurations are possible: 1. floated is when a vessel is simply smoothed over, leaving a plain, undecorated surface; 2. polishing results when the surface has been polished to a high gloss by use of some form of abrasive; 3. slipping is the presence of a thin layer of clay added to the vessel surface after the paste had become leather-hard; 4. slipped and polished is the presence of a polished, thin layer of clay, the slip, over a vessel surface; 5. cordmarking is the presence of discernible cord impressions. The twisting of the cordage may be discernible; 6. brushing is the presence of striations caused by the application of a flexible tool in smoothing the clay; 7. simple stamping is the presence of indentations in the clay in no regular fashion; 8. check stamping is the systematic alignment of a series of indentations in the clay with a checkerboard pattern; 9. cordmarking and slipping is the presence of a slip added after the vessel was cordmarked; 10. slipping and cordmarking is the presence of cordmarking occurring after a slip was applied to the vessel.

Potential errors: Most of the above configurations are easily recognized. The presence of a slip may be the most difficul' treatment to discern.

Cultural-historical position: In the Kansas City area, the presence of indentations is most commonly associated with the Kansas City Hopewell Complex, while cordmarking is associated with Late Woodland and later complexes and periods. Slips are presently known to occur only during the Late Woodland period and Steed-Kisker complex.

Research value: Exterior surface treatment lends information about cultural-historical position.

Interior Surface Treatment

Definition: The same configurations used for exterior surface treatment apply for interior surface treatment.

Potential errors: Most kinds of interior surface treatments are easy to recognize. The presence of a slip may be difficult to determine.

Research value: The interior surface treatment lends information about cultural-historical position and pottery manufacturing methods.

Smoothing Over Exterior Surface Treatment

Definition: This discrete attribute is the presence or absence of smoothing over any of the above surface treatments.

Potential errors: This is usually easily recognized.

Research value: Smoothing lends information about methods of pottery manufacture.

Smoothing Over Interior Surface Treatment

Definition: This discrete attribute is the presence or absence of smoothing over any of the above surface treatments.

Potential errors: This is usually easily recognized.

Research value: Smoothing lends information about methods of pottery manufacture.

Randformen-Kombinationstabelle Number

Definition: This is a method for determinating rim forms (Steuer 1971). Figure 2.6 shows the different rim configurations and their assigned numbers.

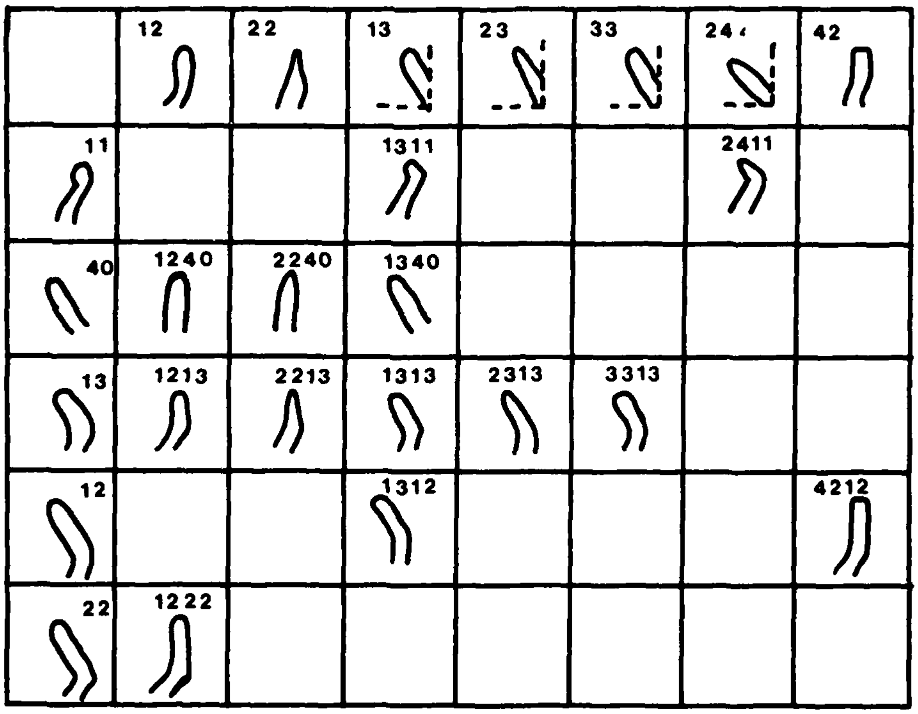


Figure 2.6 The Randformen-Kombinationstabelle rim forms used in this study (from Steuer 1971).

Potential errors: This is usually easily recognized.

Cultural-historical position: Rim forms tend to be either straight, excurvate or incurvate. Kansas City Hopewell rims tend to be straight on conical shaped vessels. Late Woodland rims tend to be straight to excurvate, while later pottery types may have straight or incurvate rims.

Research value: Rim forms may lend information about vessel function.

Collar

Definition: This discrete attribute accounts for the presence or absence of a collar on a rim.

Potential errors: This is easily recognized.

Cultural-historical position: In the Kansas City area, collars are usually absent from pottery vessels. Pottery associated with the Central Plains Tradition (A.D. 1000 to 1450) often has collared rims.

Research value: The presence or absence of collars allows determination of cultural-historical position.

Lip Thickness

Definition: This is the thickness, in mm, of the vessel edge at the orifice opening (Fig 2.7).

Potential errors: This is easily measured.

Research value: Lip thickness may lend information about vessel size and function.

Rim Thickness

Definition: This is the thickness, in mm, of the vessel rim (Fig. 2.7).

Potential errors: Rim thickness tends to vary around the vessel. Several rim thickness measurements should be made and averaged for any single vessel or large sherd.

Research value: Rim thickness lends information about vessel size and function.

Rim Height

Definition: This is the height of the rim in mm (Fig. 2.7).

Potential errors: This is easily measured.

Research value: Rim height may provide information about vessel size, shape and function.

Rim Diameter

Definition: This is the diameter of the orifice in mm (Fig. 2.7).

Potential errors: This is easily measured with the aid of an orifice measuring board. The measuring board consists of a series of concentric circles with their corresponding diameters. Rim sherds are placed, with the lip down, on the board and the curvature of the sherd is matched with one of the concentric circles. The corresponding diameter is read in mm.

Research value: Rim diameter may lend information about vessel size and function.

Shoulder Thickness

Definition: This is the thickness of the vessel shoulder in mm (Fig. 2.7).

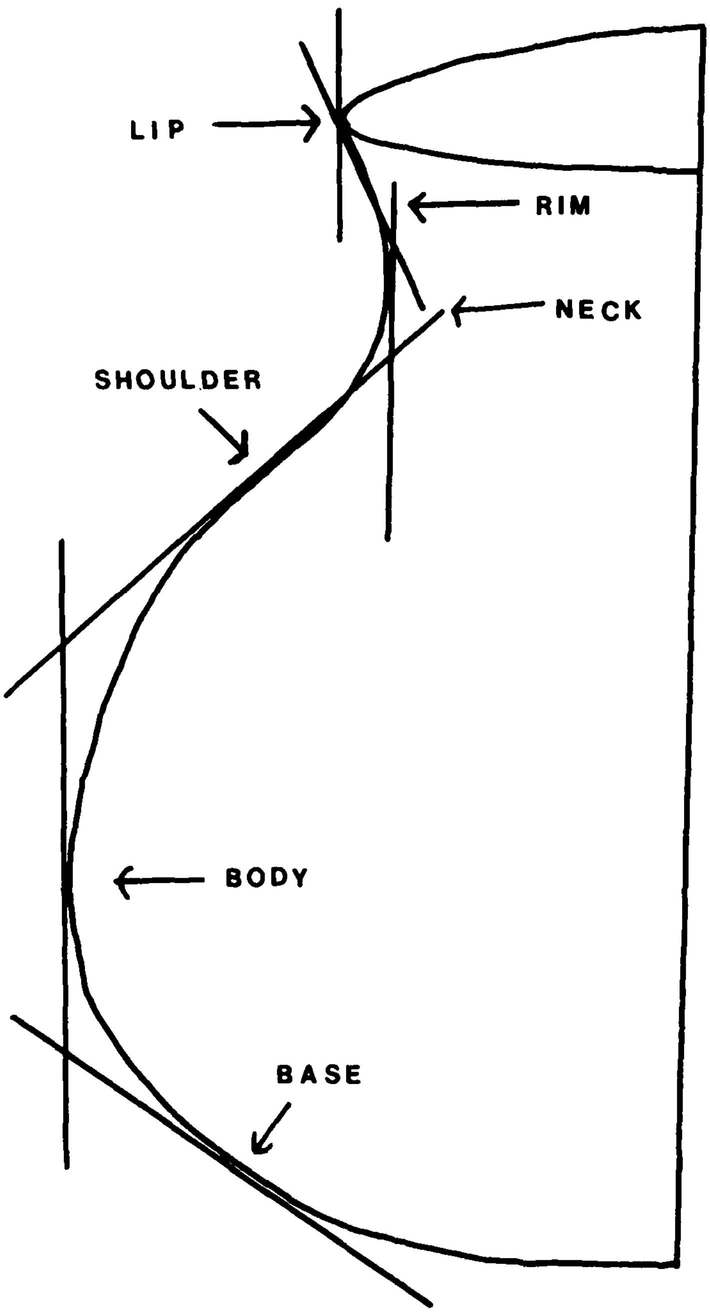


Figure 2.7 The location of inflection points on a pottery vessel and the corresponding parts (from Shepard 1956:226).

Potential errors: Shoulder thickness tends to vary around the vessel. Several measurements should be made and averaged for any single vessel or large sherd.

Research value: Shoulder thickness lends information about vessel size and function.

Body Thickness

Definition: This is the thickness, in mm, of the body wall of a vessel. This is usually the only measurement made on body sherds.

Potential errors: This measurement is easily made.

Research value: Body thickness may lend information about vessel size and function.

Lip Decoration

Definition: Five configurations of lip decoration are used in this report: 1. undecorated; 2. punctated lips have semi-lunar, circular, triangular, or oval depressions made on the lip before the clay became leather hard; 3. notches are V-shaped indentations made before the clay became leather hard; 4. finger nail impressions were pushed into the clay before it became leather hard; and, 5. crenations are rounded projections on the lip, resulting in a form similar to a pie crust.

Potential errors: This attribute is easily recognized.

Cultural-historical position: Semi-lunar punctates superimposed over a smoothed or cordmarked surface may be attributable to the Early Woodland (Griffin 1952). Circular punctates and finger nail impressions occur on Kansas City Hopewell complex pottery. Crenated lips occur during the Maybrook complex and Kansas City Hopewell complex.

Research value: The form of lip decoration provides cultural-historical information.

First Band Element

Definition: This is the configuration of a single element of decoration on a vessel at the point nearest to the lip. Much of the pottery within the Great Plains is decorated around the vessels in a series of bands, with each band consisting of a single or combination of decorative elements. The decorative elements identified in this report are presented in Table 2.5. Most have been defined above.

Potential errors: This attribute is easily recognized.

Cultural-historical position: The combination of decorative elements allows determination of relative placement of a particular vessel within a given prehistoric complex. As examples, semi-lunar punctates superimposed over cordmarking is associated with Early Woodland, simple cordmarking is associated with Late Woodland and later periods.

Research value: The combination of decorative elements may allow determination of cultural-historical position. A seriation of Kansas City Hopewell pottery (Johnson and Johnson 1975) shows early styles as more elaborately decorated than later. Similar studies are potentially possible for other prehistoric complexes in the Kansas City area.

First Band Orientation

Definition: This is the orientation of a decorative element. Orientation may be horizontal, vertical, diagonal from upper right to lower left and diagonal from upper left to lower right.

Potential errors: This attribute is easily recognized.

Research value: Orientation of decorative elements may lend information about cultural-historical position.

First Band Motif

Definition: This is the configuration of a combination of single decorative elements described above.

Potential errors: This attribute is easily recognized.

Research value: Arrangements of decorative elements in motifs may lend information about cultural-historical position.

First Band Width

Definition: This is the width, in mm, of the first motif. The number of band elements and band motifs may be increased when recording pottery data in order to accomodate all necessary information.

Potential errors: This attribute is easily measured.

Research value: Motif width may lend information about cultural-historical position.

Cord Diameter

Definition: This is the diameter of the cords used to make cord impressions on cordmarked pottery. This measurement was made by using a measuring ocular on a binocular microscope. Measurements are to the nearest .1 mm.

Potential errors: Diameters tend to vary along the length of the cord impression, consequently several measurements were made and averaged.

Research value: Cord diameters may lend information with cultural-historical significance.

Cord Spacing

Definition: This is the spacing of the cord impression to the nearest one mm. This measurement was made using a measuring ocular on a binocular microscope.

Potential errors: Cord spacing varies along the length of the cords. Several measurements were made and averaged to arrive at a more meaningful measurement.

Research value: Cord spacing may lend information about vessel construction and may also have cultural-historical significance.

Cord Twist

Definition: This is the direction in which the cordage used to make cord impressions was wound. Examination of cordmarked sherds under a binocular microscope with a zoom lens from 7X to 30X was used. Sherds with cord impression appearing as ZZZ where recorded as having been impressed with SSS twisted cords and those whose impressions appeared as SSS were recorded as having been impressed with ZZZ twisted cords. The impresssions on sherds are mirror or negative images of the cords used to make the impressions.

Potential errors: This attribute is easily recognized.

Research value: Cord twist may provide information about pottery style and idiosyncrancies of individual potters.

Uniform Cord Spacing

Definition: This discrete attribute is the presence or absence of uniform spacing between cord impressions.

Potential errors: This is easily recognized.

Cultural-historical position: Analysis of pottery from the Sperry site, 23JA85 (See Brown, this volume), and the Seven Acres site, 23JA115 (see Brown, this volume), indicate the presence of uniform cord spacing as a characteristic of the Maybrook complex and lack of uniform cord spacing as characteristic of the Late Woodland period. This information, in conjunction with the type of temper, allows separation between cord-marked sherds of the Late Woodland period and the Maybrook complex.

Research value: Uniformity of cord spacing has cultural-historical significance.

CHAPTER 3

Sites Tested
by
Robert J. Ziegler

Introduction

This chapter describes the results of investigations at five archaeological sites within the Little Blue River channel-modification right-of-way. Four sites (23JA32, 23JA36, 23JA79, and 23JA80) were tested by a crew from the Museum of Anthropology, University of Kansas, during the summer of 1977. Additional tests were conducted at 23JA36 during June of 1979. A fifth site (23JA55) did not require testing, since a surface reconnaissance indicated that it had been destroyed by previous land-altering activities.

Test pits in all four sites were excavated in the following manner. The plow zone, which varied from 20cm to 35cm deep, was removed in $1m^2$ units. Below the plow zone, excavation proceeded in $1m^2$ units and arbitrary ten cm. levels to a maximum depth of one meter or to a depth that exceeded cultural materials. In addition, a soil probe was inserted in the floor of each pit to test for the presence of cultural deposits below floor level. This procedure, in effect, increased the depth of each test by about 30 cm. Tools were plotted in three dimensions to the nearest centimeter. All soils were screened through ¼ in. mesh hardware cloth. And finally, the fill recovered from features was saved for water flotation.

In an attempt to define site limits, and internal variations within sites, soil samples were taken at numerous points within and outside each of the sites tested. The results of the analyses of soil samples are presented in Chapter 7 of this volume (See Filer, this volume).

Surface artifacts described in this chapter were classified according to the surface classification system in Chapter 2 of this report. Artifacts from test excavations were classified according to the morphological classification system also described in Chapter 2.

23JA32

Background

Site 23JA32 is in the SW¼, SW¼, Section 31, T48N, R31W, on the U.S.G.S. 7.5 Minute Independence Quadrangle. The site is situated on the east bank and the second terrace of the Little Blue River (Figs. 1.1 and 3.1). Although known by local collectors for many years, the site was not formally reported until 1961 by W.R. Wilson (Survey Sheet, Archaeological Survey of Missouri). The Casey family, whose property is located at the nearby intersection of Velie and Lee's Summit roads, has collected artifacts from the site for two generations (Mike Casey, personal communication). In 1973, Mike Heffner of the Museum of Anthropology, University of Kansas, examined the Casey collection. Regarding cultural affiliation, Heffner described the site as multi-component, having both prehistoric and historic components (Heffner 1974:9). The presence of large, stemmed, projectile points and grit-tempered plain or cord-roughened pottery suggested Woodland occupations, the ceramics being characteristic of the Late Woodland period (Heffner 1974:9). Uniform buttons and "Minnie Balls" indicated a Civil War component (Heffner 1974:9).

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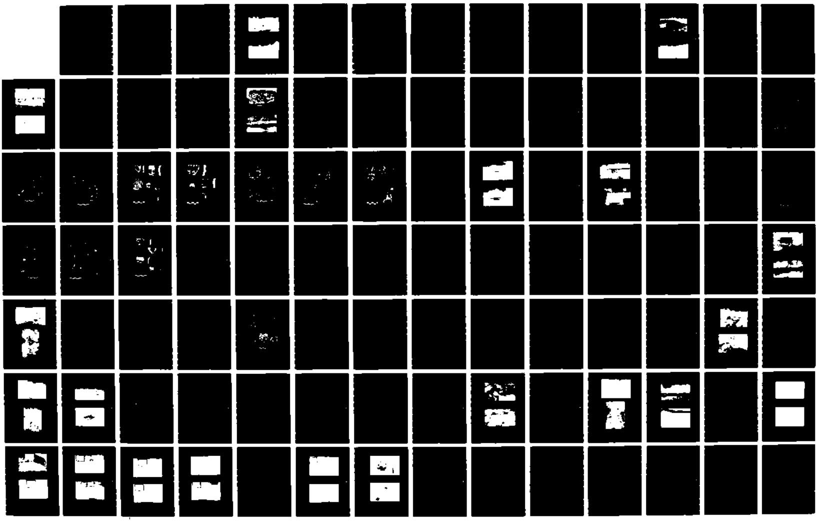

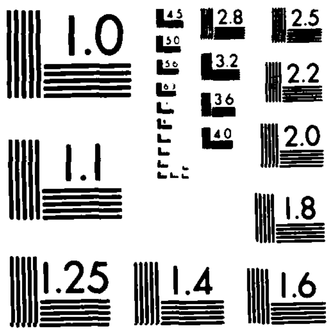

MICROCOPY RESOLUTION TEST CHART
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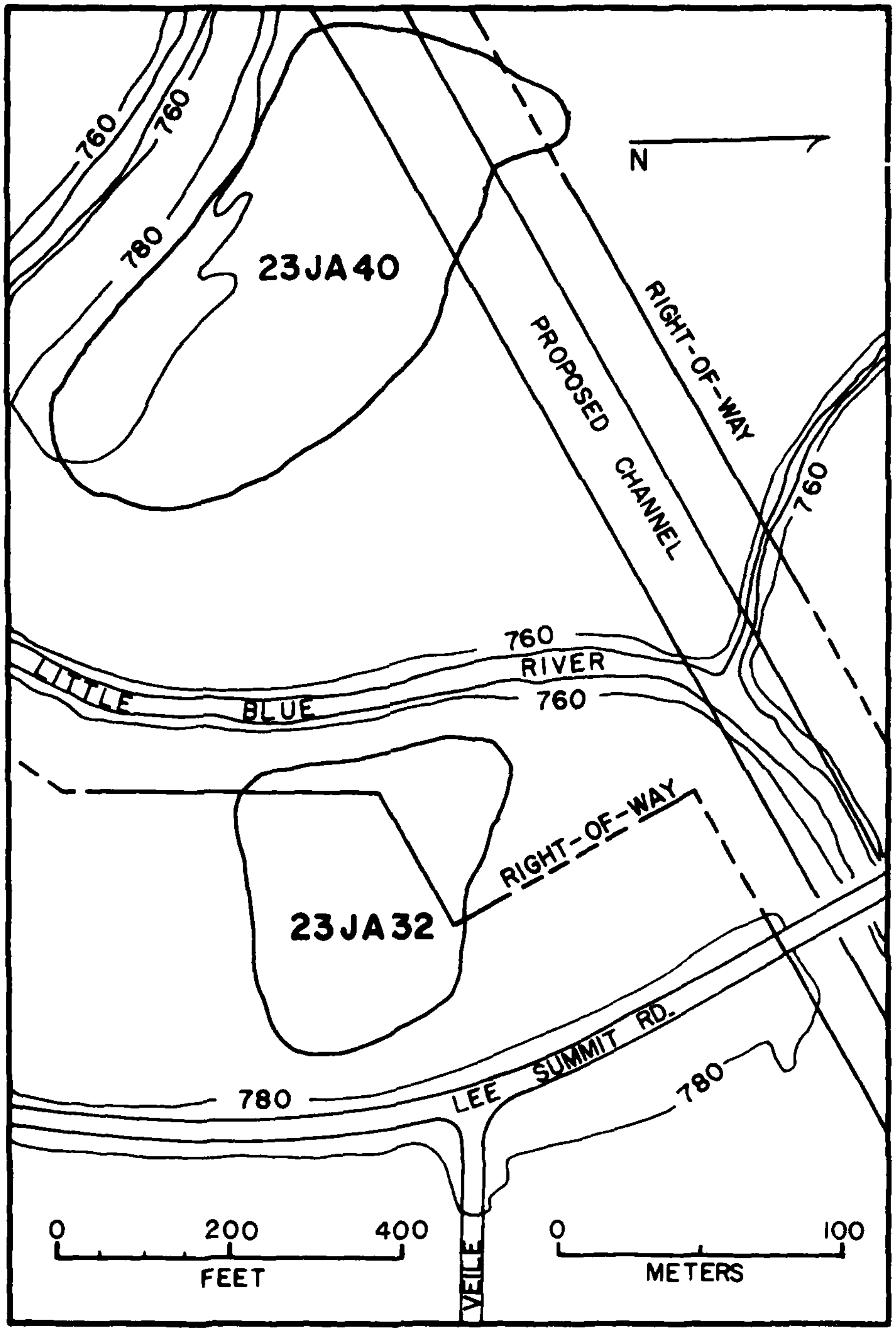


Figure 3.1 The locations of sites 23JA32 and 23JA40 (see also Fig. 1.1).

During July 5 to July 12, 1977, a three person crew from the Museum of Anthropology collected a surface-grab sample and conducted test excavations at 23JA32. A total of 18 man-days were required to test the site.

Surface-Grab Sample

Site 23JA32 covers approximately 10,000m²; less than 4,000m² is within the proposed channel right-of-way (Fig. 3.1). Nearly all of that portion of the site outside of the right-of-way boundary has been disturbed by land alterations in the form of agricultural terraces. These terraces are about 20 m. apart and oriented due east-west. The portion of the site within the right-of-way has not been disturbed by terracing.

When investigated in 1977, the site was planted in alfalfa (Fig. 3.2a). Soon after the alfalfa was cut, a small, surface-grab sample was recovered. The quantities of artifacts collected from the surface, as well as those recovered from test excavations and described below, are presented in Table 3.1.

Test Excavations

Prior to testing, a datum was established on the western edge of the alfalfa field, about ten meters south of the natural river terrace scarp (Fig. 3.3). Five 1 x 2 m. test pits were placed within the channel right-of-way (Fig. 3.3). Each was excavated to a depth that exceeded cultural debris, varying from 45-75 cm. below the present surface of the ground.

Two soil zones were recognized: 1. a 10YR 3/2 (very dark greyish brown) silty clay plow zone extended 30-35 cm. in depth; and 2. a 10YR 4/3 (dark brown) clay beneath the plow zone. A vast majority of cultural debris recovered, was associated with the plow zone.

Prehistoric and historic artifacts recovered from test excavations at 23JA32 are listed in Table 3.1 (see also Fig. 3.4). No features, prehistoric ceramics, or ecofacts, were encountered in any of the test pits.

Summary and Discussion

Modern agricultural practices undoubtedly have disturbed that portion of the site outside of the channel right-of-way. An estimate of the amount of destruction cannot be made, since no tests were placed in that area.

The portion of the site of interest here, within the right-of-way, was not terraced. Tests, however, suggest that there are no significant cultural deposits in that area.

Based on data recovered from the test pits, little can be said about the nature of the prehistoric occupation of the site. Only 13 pieces of chipped stone were recovered; eight came from the plow zone. All 13 are Winterset chert.

Approximately 90 percent of the modern artifacts recovered came from the plow zone. Of the total sample of modern artifacts, 1058 (97 percent are gravel-sized pieces of stone, probably associated with a recent disturbance. The remainder, 33 (3 percent) consists of mortar, glass, brick, metal fragments, unidentifiable ceramic fragments, and two, metal nails. Both nails are in poor condition and cannot be dated with any degree of percision; it can only be stated that both are the square-cut type, manufactured from the 18th century onward until about 1950 (Fontana et al. 1962:55).

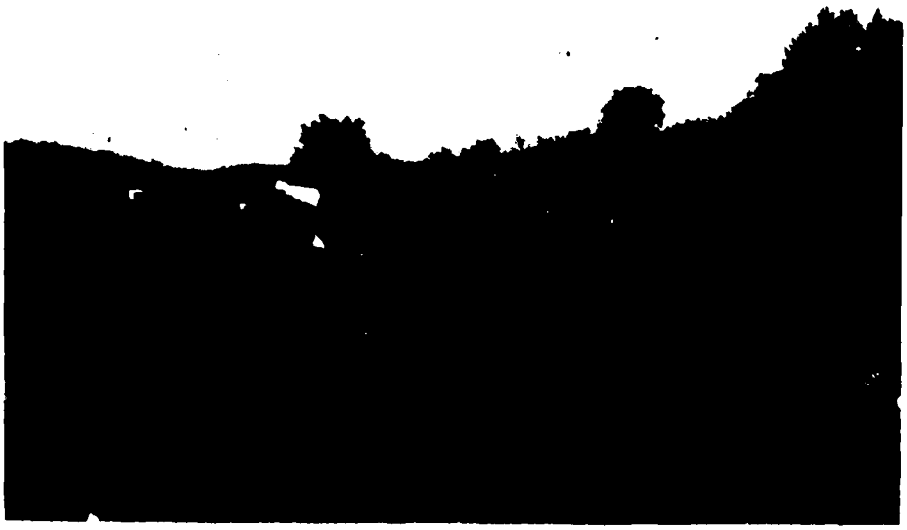


Figure 3.2 a. View of 23JA32, looking east.
b. Plane-table mapping of 23JA36 (west area), looking southwest.

Table 3.1

Artifacts Recovered from 23JA32

Artifact Class/Code	Quantity
Surface:	
Core (60)	1
Chunk (65)	1
Debitage (70)	2
Unworked Stone (90)	2
Unworked Bone (150)	1
Modern (200)	2
Test Excavations:	
Chipped Stone (see Fig. 3.4)	13
Burned Earth (1090)	2
Modern (2000)	1091

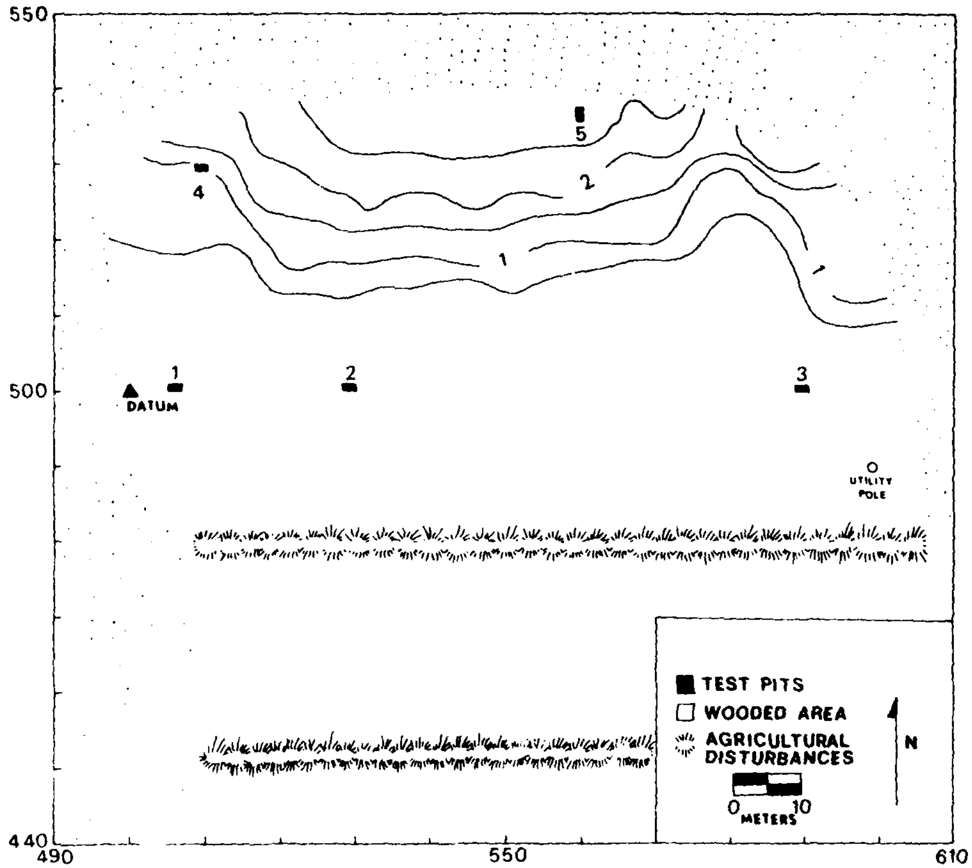


Figure 3.3 Contour map of 23JA32, showing the placement of datum point and test excavations. Contour lines are measured in .5 m. below datum elevation.

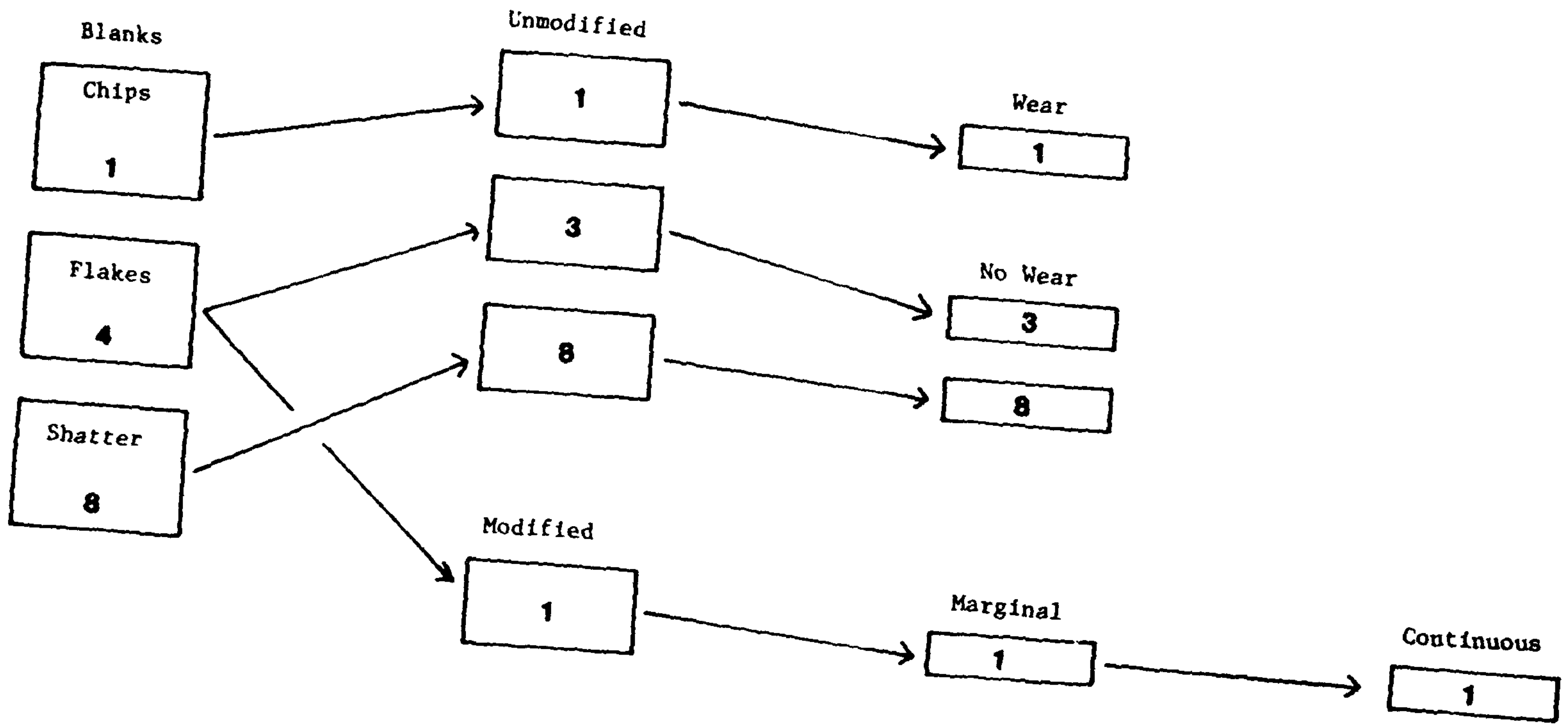


Figure 3.4 Hierarchical-morphological classification of chipped-stone artifacts recovered from test excavations at 23JA32.

In sum, no identifiable Civil War artifacts were recovered in 1977. It is probable that most of the historic materials recovered from test excavations postdate the postulated Civil War component. According to Mike Casey, a mill was present on the site following that era.

23JA36

Background

Site 23JA36 is in the NW¼ of the NW¼ of section 32, and the SE¼ of the SW¼ of Section 29, T49N, R32W, on the U.S.G.S. 7.5 Minute Blue Springs Quadrangle. The site is situated on the first and second terraces along the north bank of the Little Blue River (Fig. 3.5). In 1961, W.R. Wilson recorded the site (Survey Sheet, Archaeological Survey of Missouri). At that time, Wilson collected several large, stemmed projectile points and grit tempered pottery. In 1973, Mike Heffner of the Museum of Anthropology, University of Kansas, examined 23JA36. No surface materials were recovered, since the site was covered by dense vegetation (Heffner 1974:12).

A controlled-gridded surface collection and test excavations at 23JA36 were conducted by a six person crew from June 15 to July 1, 1977, and by a four person crew from June 25 to June 30, 1979. A total of 112 man-days were required to test the site. Three features, lithics, ceramics, and a small quantity of faunal and floral remains were recovered. Three charcoal samples from features yielded radiocarbon dates indicating Early Woodland and Late Woodland components.

During June of 1979, additional test excavations were conducted at 23JA36 (Fig. 3.6). These tests were needed to evaluate the impact on cultural resources within the actual channel right-of-way. When the original test excavations were conducted in 1977, the Corps of Engineers did not provide information showing the precise boundaries of the channel right-of-way. Subsequently, information was supplied by the Corps of Engineers which showed that the 1977 tests were placed too far north. Thus, the need for the 1979 tests.

Few prehistoric artifacts were recovered in 1979. Cultural deposits in this area were shallow and appeared to have been severely disturbed by Corps of Engineers bulldozing activities associated with channel construction (Fig. 3.7a).

The results of the 1977 investigations are presented first, followed by a discussion of the 1979 test excavations.

Surface Investigations

When visited in 1977, the central portion of 23JA36 had been destroyed by trenching operations for the Little Blue Interceptor Sewer. To expose surface materials, the site was plowed. A few swaths with the plow indicated that cultural debris was concentrated in two areas. Plowing continued in these areas, resulting in 4,750 m^2 being plowed west of, and 4,200 m^2 east of the sewer disturbance (Figs. 3.2a, 3.7b, and 3.8a). An extremely dense concentration of chipped stone and fire-altered limestone appeared in the west area; cultural materials in the east area occurred in considerably smaller quantities. Therefore, a gridded surface collection was conducted in the west area, while a surface-grab sample was deemed sufficient for the east area.

The surface grid at 23JA36 consisted of 5 m. squares. All visible cultural materials were collected and bagged according to square. Table

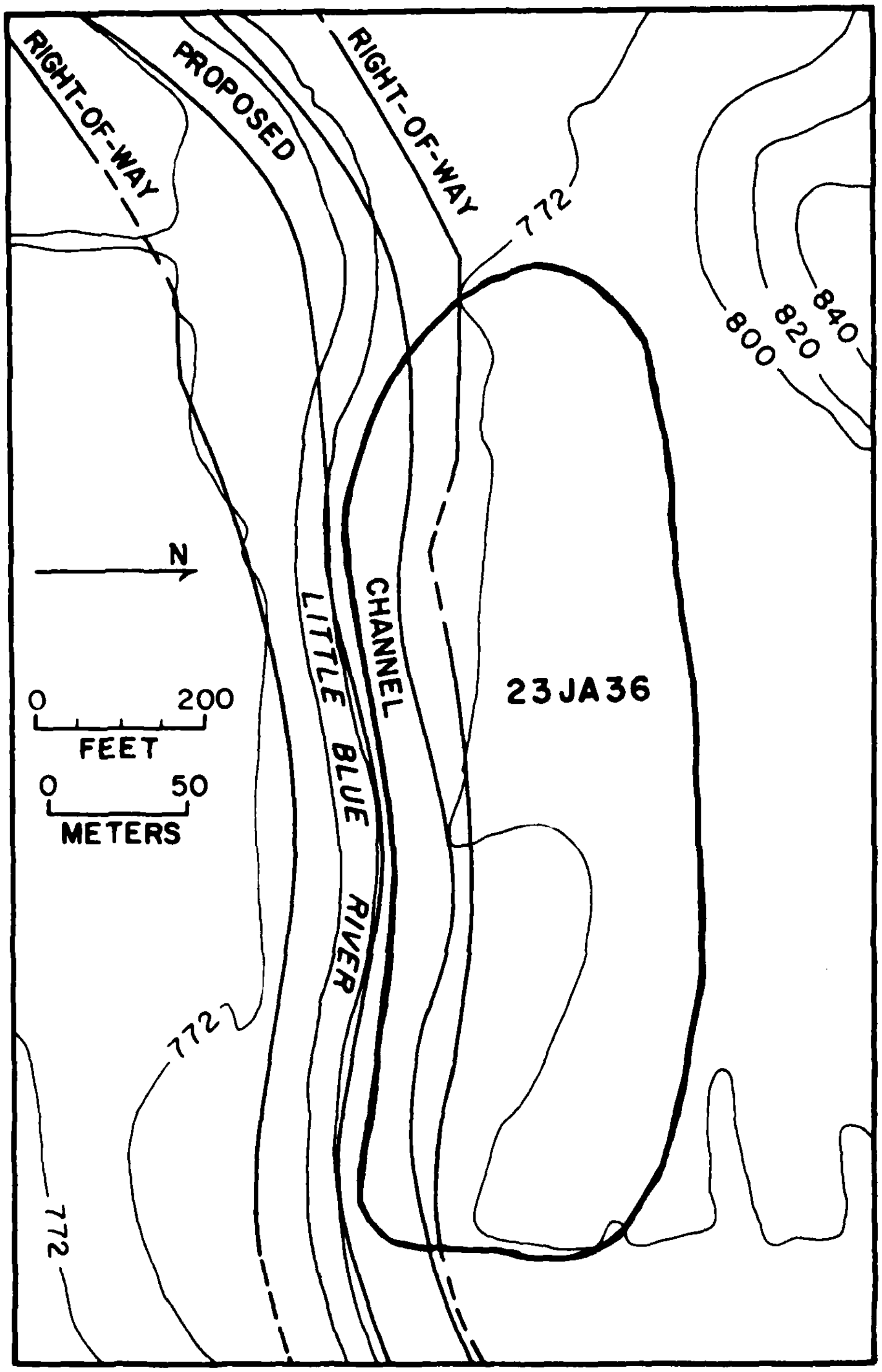


Figure 3.5 Site 23JA36 and its relationship to the channel right-of-way (also see Figure 1.1).

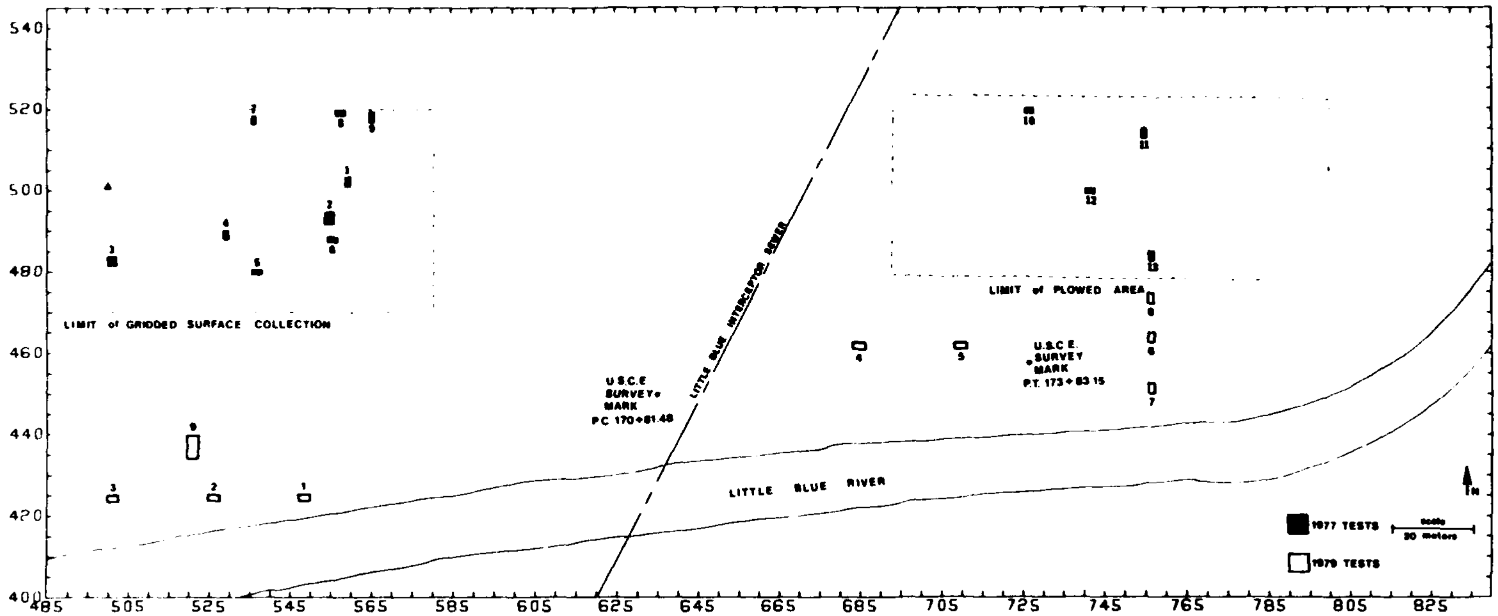


Figure 3.6 Map showing the 1977 and 1979 test excavations at 23JA36.

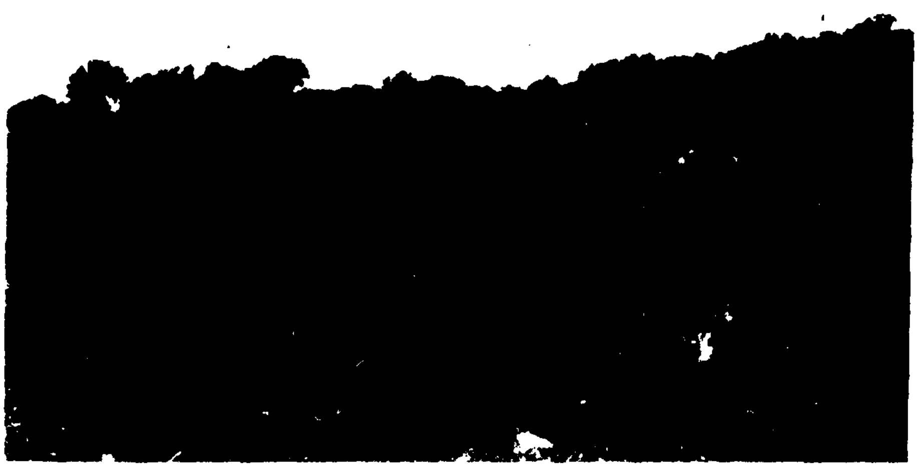


Figure 3.7 a. View of 23JA36, showing the area bulldozed in 1979.
b. View of 23JA36 (east area), looking west.

3.2 shows the quantities of artifacts recovered in the surface collection, as well as those collected from the east area of 23JA36 and discussed below. Contour maps of selected groups of artifacts are presented in Figs. 3.9-3.11.

Generally, as subsequent test excavations demonstrated, there was a good correspondence between surface and subsurface concentrations of artifacts, particularly those buried less than 30 cm. Two features were indicated by surface concentrations. Feature 2, a hearth, was indicated by the presence of a concentration of limestone at approximately 560 east and 495 north (Fig. 3.9). Another hearth, feature 3, was indicated by the presence of limestone at 496-500 east of 480 north. Note also that tools and chipped stone debris were concentrated in this area (Figs. 3.10 and 3.11).

A large area, having greater than 125 pieces of chipped stone debris, was present at approximately 520-540 east and 480-495 north (Fig. 3.11). Test excavations placed in this area (Fig. 3.6, tests 4 and 5) produced large quantities of chipped stone debris. In fact, about 70% of the chipped stone debris recovered from test excavations, came from these two pits.

Surface artifacts from the west area of 23JA36 suggest the presence of several components. Three projectile points date to Late Archaic/Early Woodland times. A stemmed point (Fig. 3.14d) is similar to the Stone Square Stemmed type found in Late Archaic sites in western Missouri (Chapman 1975:257). Another (Fig. 3.15d) can be compared to the Early Woodland, Mason Contracting Stemmed points of the Illinois River Valley (Montet-White 1968:61). The third (Fig. 3.14b) is similar to Etley Stemmed points; these occur in Late Archaic/Early Woodland sites in the Illinois River Valley (Montet-White 1968:100).

A number of medium-size dart points are similar to Middle Woodland types such as Snyders, Manker, Burkett, and Steuben, from the Illinois River Valley. More importantly, several points from 23JA36 can be compared to specimens from Kansas City Hopewell sites: Fig. 3.14a and 3.15e, the Renner site (Shippee 1967:56); and Fig 3.14c and 3.15c, the Deister site (Katz 1974:20).

Only one potsherd (Fig. 3.18a) can be attributed to Kansas City Hopewell. This is a Havana-like sherd (Schock 1966:plate 2).

One artifact from the surface suggests an occupation later than Kansas City Hopewell. This is a corner-notched, serrated point (Fig. 3.14e) that probably dates to Late Woodland times.

An inventory of artifacts from the east area of 23JA36 is presented in Table 7.2. One projectile point (Fig. 3.15b) is a contracting stemmed type known to occur in Early and Middle Woodland sites. Two sherds (Fig. 3.17b and e), having vertically oriented punctates superimposed over diagonal cordmarking, suggest an Early Woodland cultural affiliation. Punctate impressions superimposed over a smooth or cordmarked surface are characteristics of the Morton complex in the Illinois River Valley (Montet-White 1968:6-7).

Test Excavations

Test pits in 1977 were placed according to surface concentrations of artifacts. A grand total of 31 m^2 was excavated, including 23 m^2 in the west area and 8 m^2 in the east area.

In the west area, tests were excavated to depths of 87 cm. below the present surface of the ground. For the most part, cultural debris was confined to the top 40 cm. One exception, however, test pit 5, contained

Table 3.2

Artifacts Recovered from the Surface of 23JA36

Artifact Class/Code	Surface Grid	Surface Grab
Sherd (10)	45	10
Projectile Point (20)	6	3
Biface (40)	22	8
Uniface (50)	66	12
Core (60)	22	3
Chunk (65)	108	21
Debitage (70)	5132	341
Worked Stone (80)	5	1
Unworked Stone (90)	358	2
Limestone (100)	712	138
Hematite (110)	6	
Burned Earth (130)	67	31
Unworked Bone (150)	11	2
Modern (200)	18	3

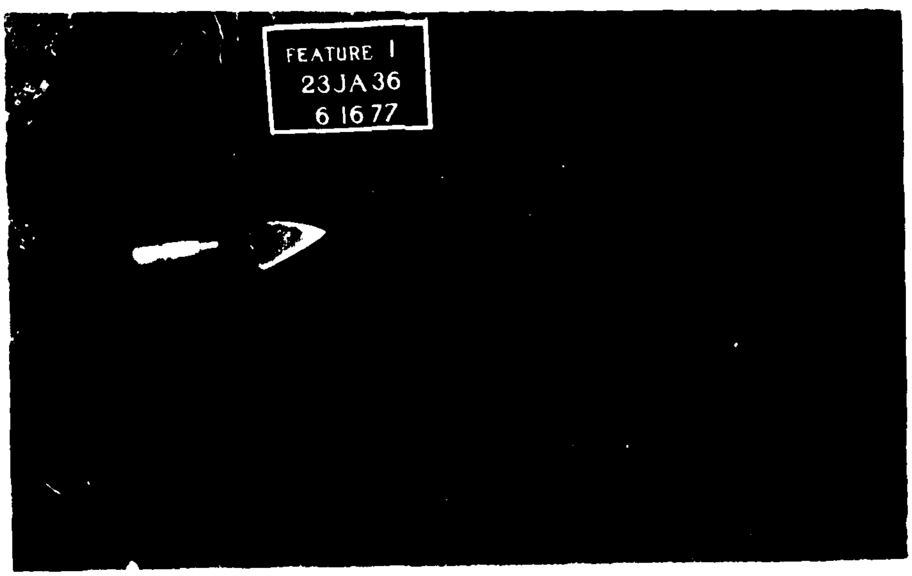


Figure 3.8 a. View of testing at 23JA36 (east area), looking south.
b. Feature 1 at 23JA36.

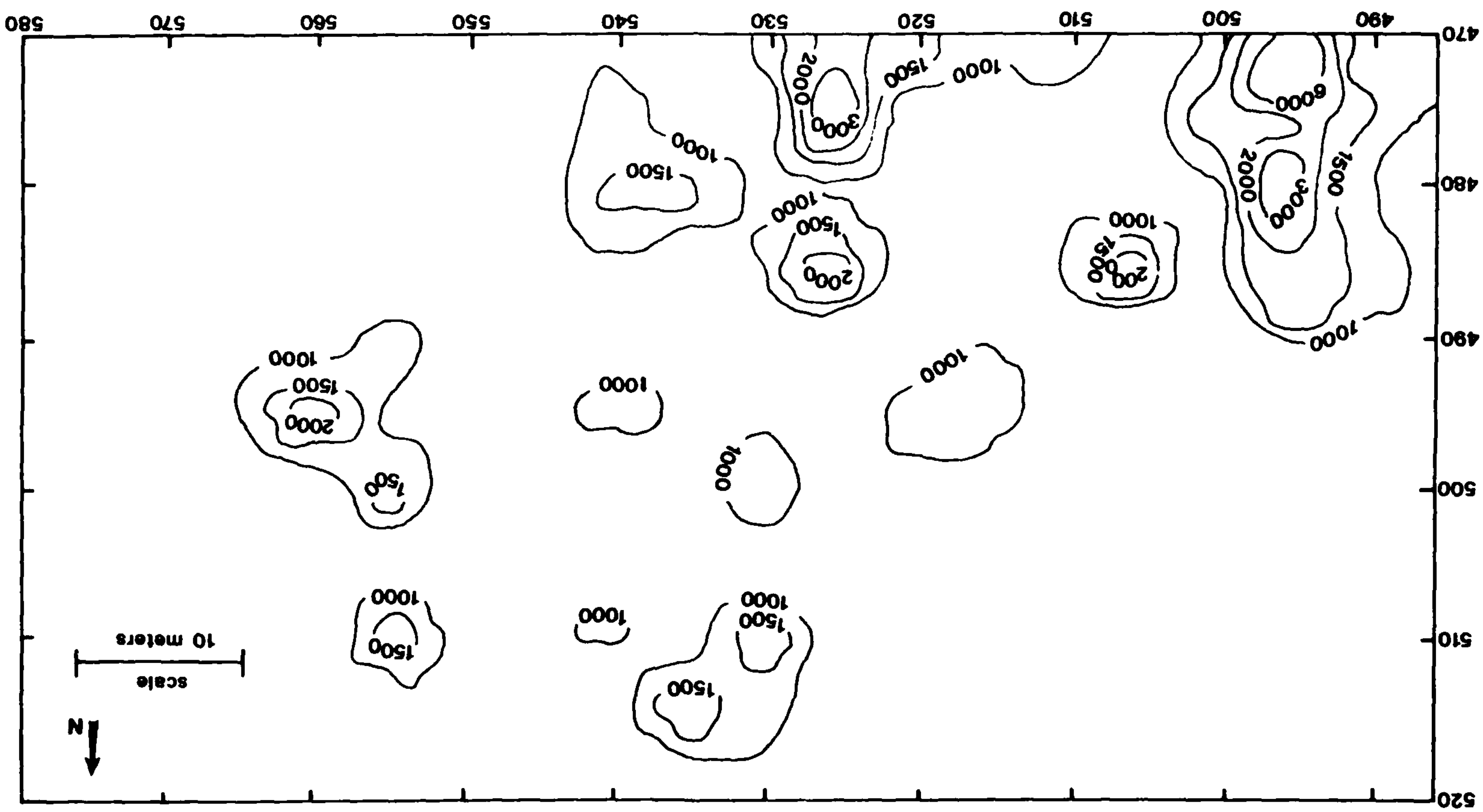


Figure 3.9 Density map of limestone, according to weight, recovered from the west area of 23JA36. The density lines represent intervals of 500 grams of limestone.

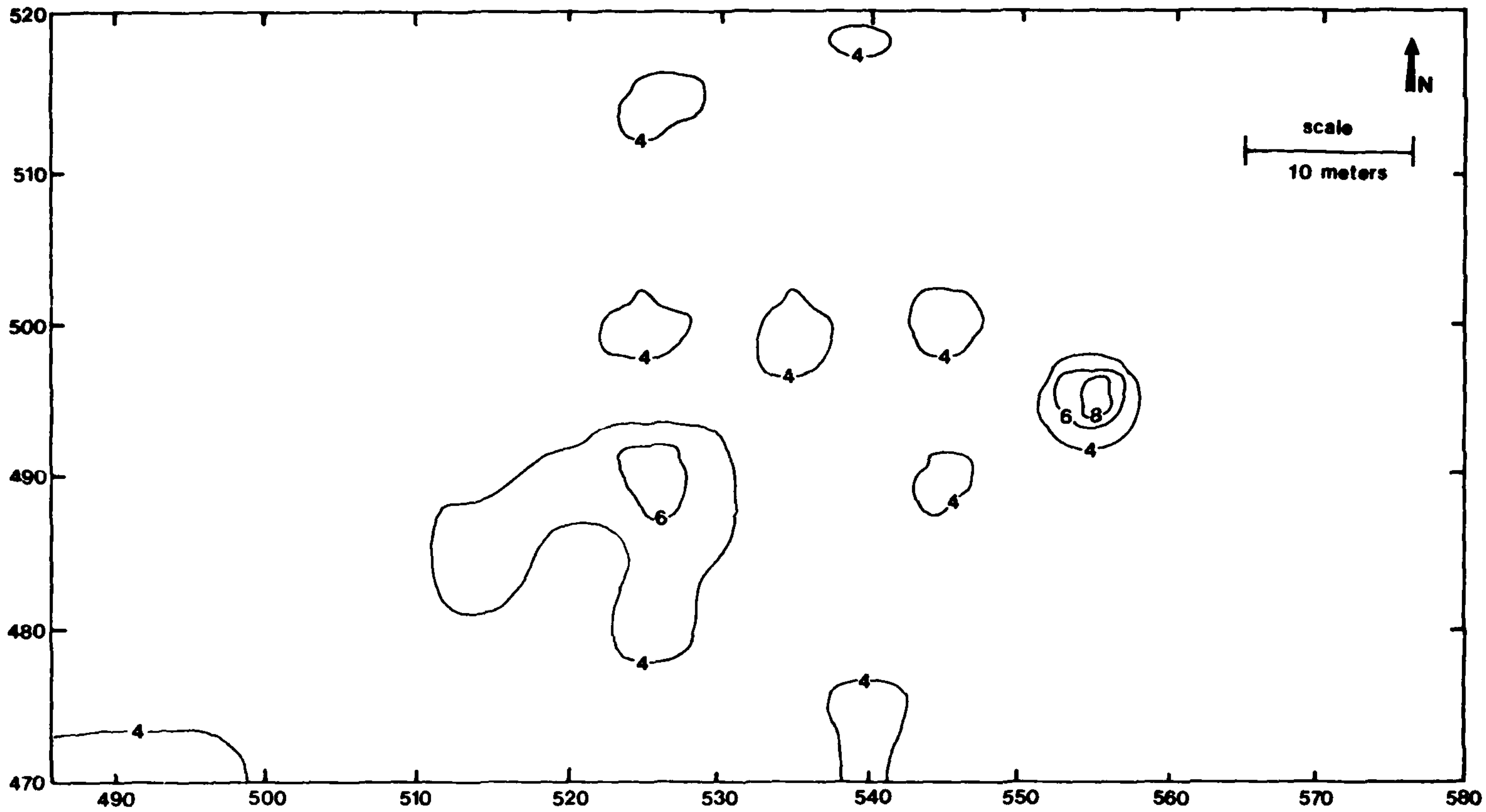


Figure 3.10 Density map of chipped-stone tools, according to frequency, recovered from the west area of 23JA36. The density lines represent intervals of two tools.

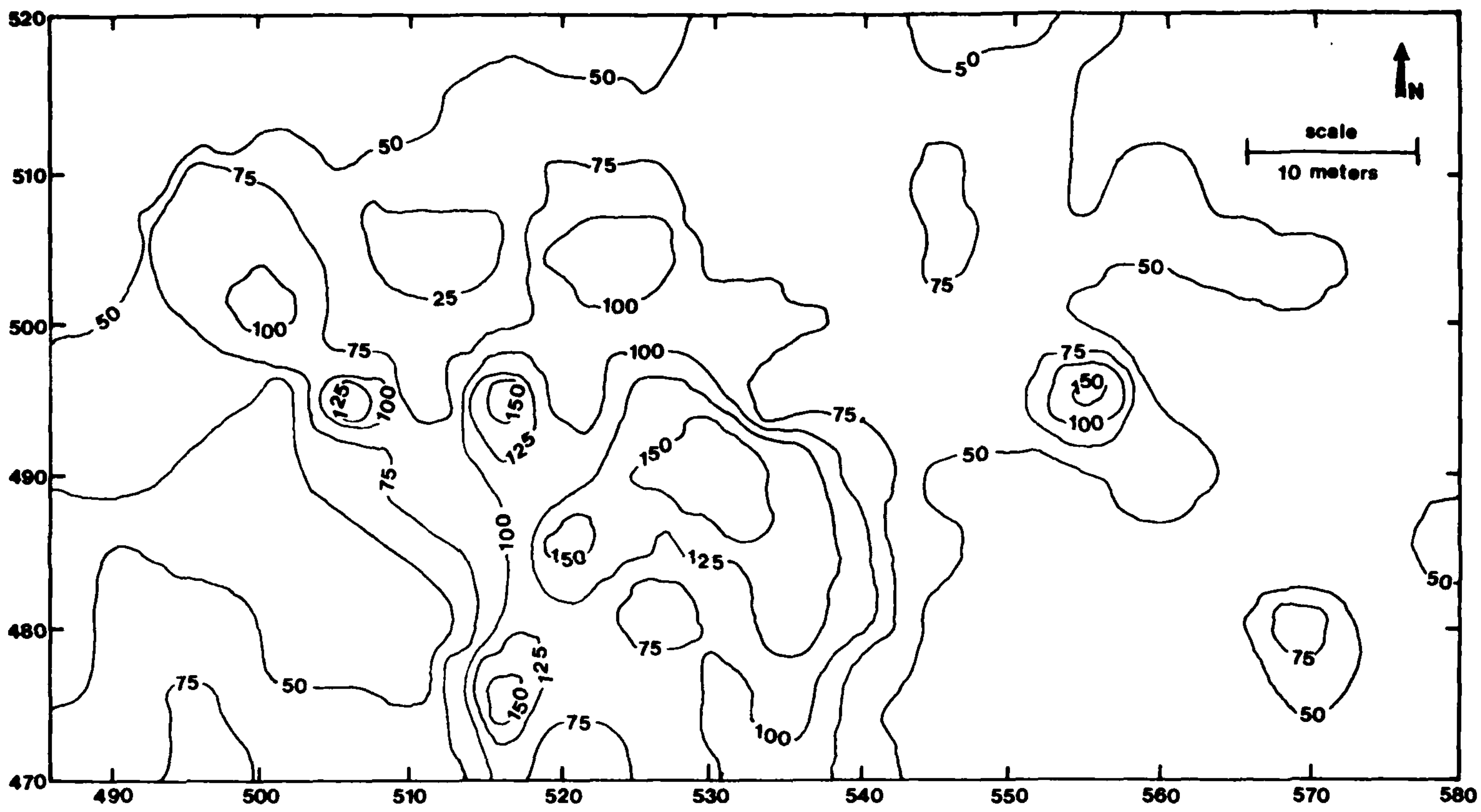


Figure 3.11 Density map of chipped-stone debris, according to frequency, recovered from the west area of 23JA36. The density lines represent intervals of 25 pieces of debris.

Figure 3.12 a. Feature 2 at 23JA36.
b. Profile of feature 2.

more than 150 pieces of chipped stone in a 1 m^2 x 10 cm. level that extended to a depth of 87 cm. below surface.

In the east area, tests were excavated to depths of 60 cm. below the present ground surface. Very little cultural debris was recovered from tests 11-13. In test 10, cultural debris was thinly scattered in the top 35 cm. From 35-60 cm., a concentration of materials was encountered. Also present at 60 cm. were two, fist-size pieces of limestone; a probe in the floor and walls of the pit did not detect any additional pieces of limestone.

Test excavations at 23JA36 enabled the recognition of two soil zones: (1) a 10 YR3/2 (very dark greyish brown) loose, silty clay, plow zone extended to 24 cm. below the surface; and, (2) a 10 YR3/3 (dark brown) blocky clay.

Features

Feature 1, a small irregular concentration of charcoal and burned earth (Fig. 3.8b), was centered at 559.50 east and 501.40 north (Fig. 3.6, test pit 1). The maximum horizontal dimension of the feature was 20 cm., while the depth was eight cm. (35-43 cm. below surface). The only artifact in close proximity to feature 1 was a burned piece of limestone, located about 40 cm. to the southeast. A sample of charcoal from feature 1 yielded a date of 450 ± 85 B.C. (UGa-1873).

Feature 2, a large circular limestone hearth, was centered at 555.10 east and 493.00 north (Fig 3.6, test pit 2). The feature measured 150 x 135 x 19 cm. (it extended from 20 to 39 cm. below the surface). The hearth primarily consisted of pieces of limestone, ranging in size from small pebbles to slabs 20 cm. in length (Fig. 3.12a). Charcoal and burned earth were abundant within the feature. In profile (Fig. 3.12b) feature 2 exhibited a basin-shaped stain containing charcoal, bone, and burned earth. Two charcoal samples collected primarily from beneath the limestone layer in feature 2, yielded dates of A.D. 430 ± 170 (UGa-1874, and A.D. 595 ± 210 (UGa-1875). Chipped-stone artifacts recovered within feature 2 include one broken biface and several pieces of debitage. No diagnostic artifacts were associated with the feature. It is probable that feature 2 served as a shallow earth oven (Binford, et al. 1970:49).

Feature 3 (not shown), a scattering of fire-altered limestone and burned earth, was centered at approximately 501.00 east and 480.5 north. The feature apparently was a hearth that had been severely disturbed by plowing. Cultural debris was scattered in an area that measured 90 cm. in diameter. Limestone, visible on the surface, extended to a depth of 18 cm. below the present surface of the ground. Artifacts associated with feature 3 include one projectile point preform (Fig. 3.20a) and one cordmarked, sherd tempered fragment of pottery.

Chipped Stone

More than 3,500 artifacts were recovered in test excavations at 23JA36; of these, 2,426 are chipped stone (Table 3.3). More than 97% of the chipped stone recovered, is the locally-available Winterset chert. Argentine, Burlington, and Westerville cherts are present in small quantities.

Fig. 3.13 shows the morphological classification of chipped stone from 23JA36. Flakes, more than any other blank type, were selected for further modification by the prehistoric inhabitants. All of the marginally-modified tools were made on flakes. The blank type of all 18 invasively-modified tools has been obscured by modification. However,

Table 3.3

Artifacts Recovered from the 1977 Test Excavations at 23JA36

Artifact Class/Code	Quantity
Chipped Stone (see Figure 7.13)	2426
Hematite (1030)	12
Limestone (1070)	899
Unworked Stone (1080)	99
Burned Earth (1090)	83
Pottery (1100)	13
Modern (2000)	6

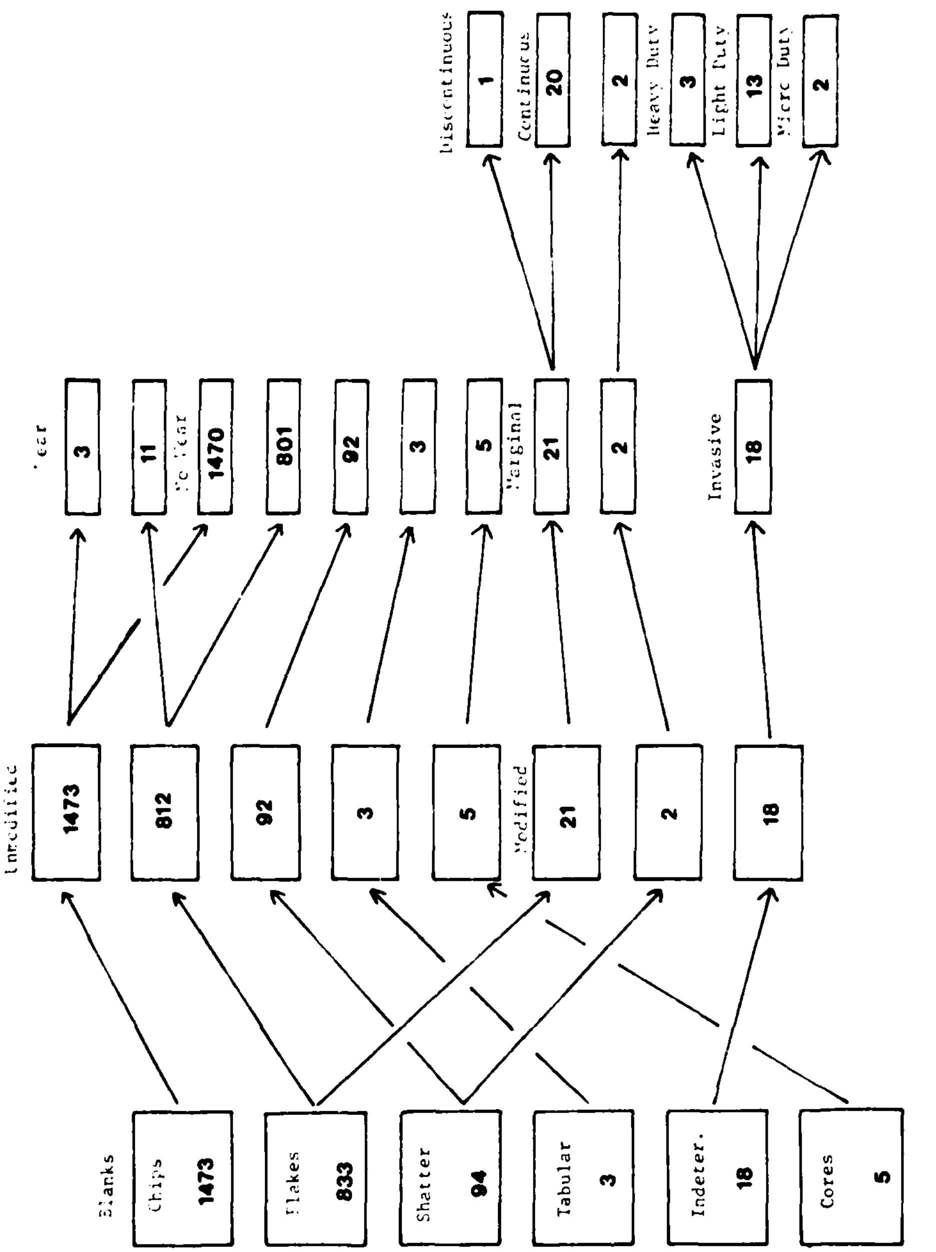


Figure 3.13 Hierarchical-morphological classification of chipped stone from 23JA36.

most are small, either micro- or light-duty tools which were probably made on flakes also.

Considering modification, only three of the 23 marginally-modified specimens nave a distinct morphology, possibly suggesting that they were specialized tools. One was classified as a notch (Fig. 3.21d), and two as perforators (Fig. 3.21f). Invasively modified tools tend to be small, either micro- or light-duty. Most are knives, preforms, or scrapers (Fig. 3.20a-d). One is a drill tip (Fig. 3.20e), and two are projectile points (described below).

Projectile points from test excavations date to Early or Middle Woodland times. A subtriangular contracting stem point (Fig. 3.15b), recovered at a depth of 24 cm. below surface, can be compared to the Early/Middle Woodland Burkett points of the Illinois River Valley (Montet-White 1968:116). Another projectile point (Fig. 3.15f), recovered from a depth of 62 cm. below surface, is similar to Kansas City Hopewell Steuben-like points (Katz 1974:20).

Ceramics

A total of 13 potsherds were recovered from test excavations at 23JA36. Eleven of the 13 were below the plow zone at depths not exceeding 45 cm. below the present surface. Eleven sherds have plain exterior surfaces, while two are cordmarked. Crushed granite is the predominate tempering material.

Selected attributes of the entire collection of ceramics from 23JA36 are presented in Table 3.4. This includes 13 specimens from test excavations and 38 from the surface. Temper was examined with the aid of a 7-30x binocular microscope.

The ceramic assemblage from 23JA36 exhibits some attributes that are characteristic of the Late Woodland period. That is, they are predominately plain surfaced and crushed granite tempered. In other respects, they differ consideribly from Late Woodland, and sites of other cultural affiliations, in the Little Blue River Valley. Those from 23JA36 tend to be thicker. Granite tempered sherds from 23JA36 have larger particles than those from other sites.

Faunal Remains

Only two bone fragments from test excavations were identifiable. One is a maxilla fragment of a brown bat (Eptescicus fuscus); the other is a carpal fragment of a deer (Odocoileus sp.).

Floral Remains

Identifiable floral remains from 23JA36 are presented in Table 3.5. The two genera represented are Amaranthus and Carya. Amaranthus grows well in floodplain forests or waste areas and disturbed ground (Jones and Bell 1974:1-11). All of the Amaranthus seeds were recovered from feature 2, while the Carya nuts were found in test pit 1 at a vertical level that suggests they may have been associated with feature 1. Both are edible genera which could have been procured in the immediate vicinity of 23JA36. Amaranthus would have grown well in disturbed waste areas within the site, while Carya would have been procured from the nearby floodplain forest. Amaranthus seeds are available from September-November (Zawacki and Hausfater 1969:49). Carya are available during September and October (Zawacki and Hausfater 1969:32).

Table 3.4

Attributes of 23JA36 Ceramics

n=51

Attribute		Quantity	(Percent)
Exterior Surface Treatment:			
Plain		38	(74.5)
Cordmarked		10	(19.6)
Cordmarked With Punctates		2	(3.9)
Havana-like		1	(2.0)
Temper:			
Crushed Granite		19	(37.3)
Sand		16	(31.4)
Sand and Grit		6	(11.8)
Sherd		3	(5.8)
Sand and Sherd		3	(5.8)
Indurated Clay		3	(5.8)
Sherd and Grit		1	(2.0)
Color:	Exterior	Interior	Core
Buff	33 (64.7)	8 (15.7)	3 (5.9)
Brown	7 (13.7)	35 (68.6)	33 (64.7)
Grey	11 (21.6)	8 (15.7)	15 (29.4)

Table 3.5

Floral Remains from 23JA36

Family	Genus	Common Name	Charred	Some Charred	Not Charred	?
Amaranthaceae	<u>Amaranthus</u>	Pigweed	3	100	22	95
Juglandaceae	<u>Carya</u>	Hickory	100+frags.			

Summary and Conclusions

Artifacts recovered in 1977 from the surface and plow zone of 23JA36 suggest a number of cultural affiliations dating from Late Archaic through Late Woodland times.

In the east area, the cultural affiliation of below plow zone materials is unknown.

In the west area, at least two and possibly three components are represented below the plow zone. An average (A.D. 496 ± 133) of the two radiocarbon dates from feature 2 (A.D. 430 ± 170 and A.D. 595 ± 210), suggests either a Kansas City Hopewell or Late Woodland occupation which extends from the bottom of the plow zone to 39 cm. below the surface. Ceramics from this vertical level are more similar to Late Woodland ceramics than Kansas City Hopewell. A radiocarbon date of 450 ± 85 B.C. from feature 1 suggests that an Early Woodland occupation lies just beneath the Late Woodland. Feature 1 extended from 35 to 43 cm. below the surface. A third component is suggested by the presence of cultural materials extending to 87 cm. below the surface. No ceramics were recovered below 45 cm., thus it is suggested that chipped stone below 45 cm. may represent an Archaic component.

Artifacts suggest that a number of procurement and maintenance tasks took place at 23JA36. A large quantity of lithic debris and tools in various stages of manufacture suggest that tool production was an important activity. Other activities inferred are hunting, butchering, hide working, and food preparation.

Based on charred *Amaranthus* seeds and *Carya* nuts, a late summer or fall occupation is postulated for both the Early Woodland and Late Woodland components. It is unlikely, due to flooding of the Little Blue River, that 23JA36 would have been occupied during the spring and early summer months.

1979 Test Excavations

When the crew arrived at 23JA36 in the last week of June of 1979, the plow zone (or about 20 cm.) within the channel right-of-way had been stripped away by the Corps of Engineers in preparation for channel construction (Fig. 3.7a). This procedure exposed a considerable quantity of chipped stone. No diagnostic artifacts or features were revealed.

To test for the presence of cultural deposits below plow zone, tests were placed within the right-of-way in both the east and west areas (Fig. 3.6). A total of 20 m^2 was excavated, including 10 m^2 in the east and 12 m^2 in the west. Test pits were excavated with shovel and trowel in a $1m^2$ units and arbitrary ten cm. levels. Time limitations precluded the screening of soils. To test for the presence of cultural materials below floor level, a post-hole auger was inserted into the floor of each test pit. This procedure, in effect, increased the depth of each test by approximately 80 cm. Finally, after all of the test pits had been dug, a bulldozer was utilized to scrape off another 20-30 cm. of soil in both the east and west areas; no artifacts or features were exposed by this procedure.

Work conducted in 1979 indicates that cultural deposits within the right-of-way were primarily limited to the plow zone, and therefore severely disturbed by bulldozing. Although test pits were excavated to an average depth of 50 cm. below plow zone, few cultural materials were found below the first arbitrary ten cm. level. To examine for deeply-buried cultural deposits, test pit 4 was excavated to a depth of 80 cm. below plow zone; no artifacts were found below the second arbitrary level (20 cm. below plow zone).

Table 3.6

Artifacts from the 1979 Test Excavations at 23JA36

Artifact Class/Code	Quantity
Unmodified Chips (100	5
Utilized Chips (105)	1
Unmodified Shatter (200)	15
Unmodified Flakes (300)	28
Modified Flakes (320)	3
Micro Notched Projectile (820)	1
Limestone (1070)	12
Modern (2000)	74

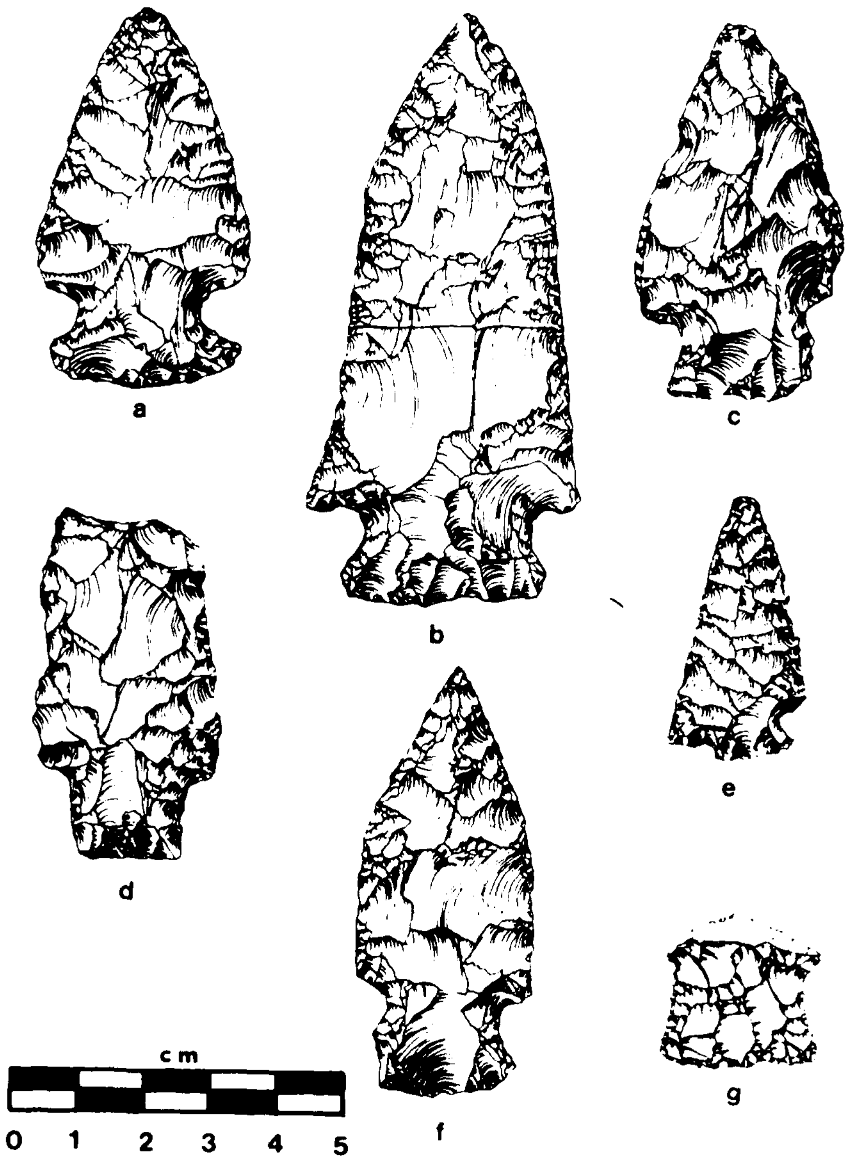


Figure 3.14 Projectile points from 23JA36: (a-e) surface (f) A0089877 (g) A0090677.

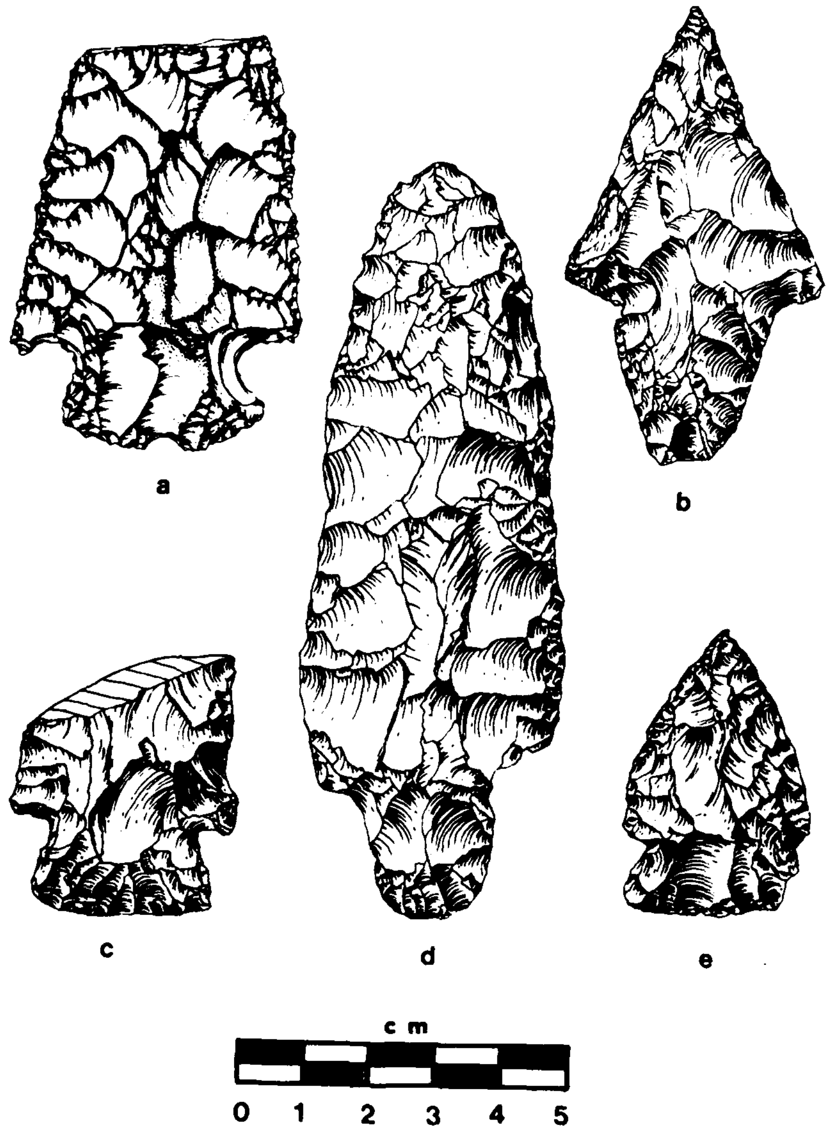


Figure 3.15 Projectile points from 23JA36: (a) A0829877 (b) A0079577 (c) A0105977 (d) A0123977 (e) A0113977.

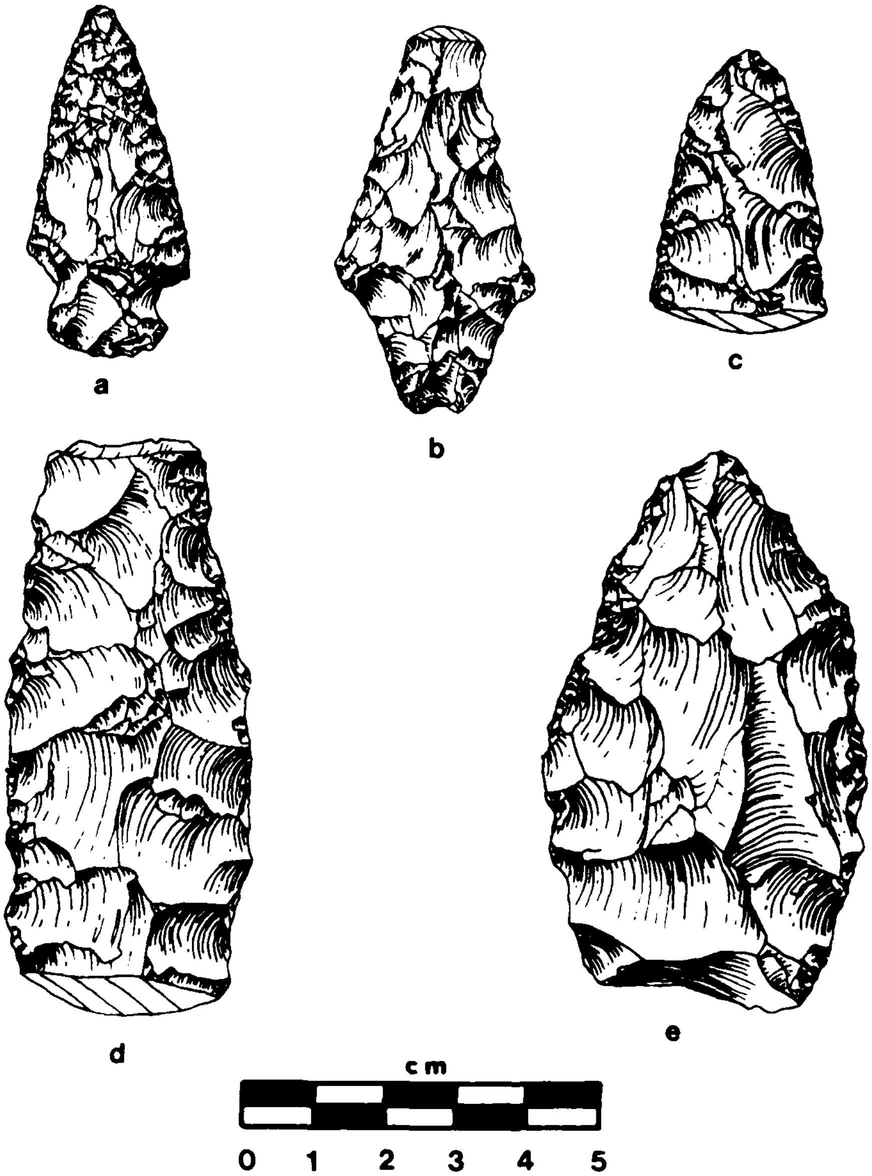


Figure 3.16 Invasively modified artifacts from the east area of 23JA36: (a-e) surface.

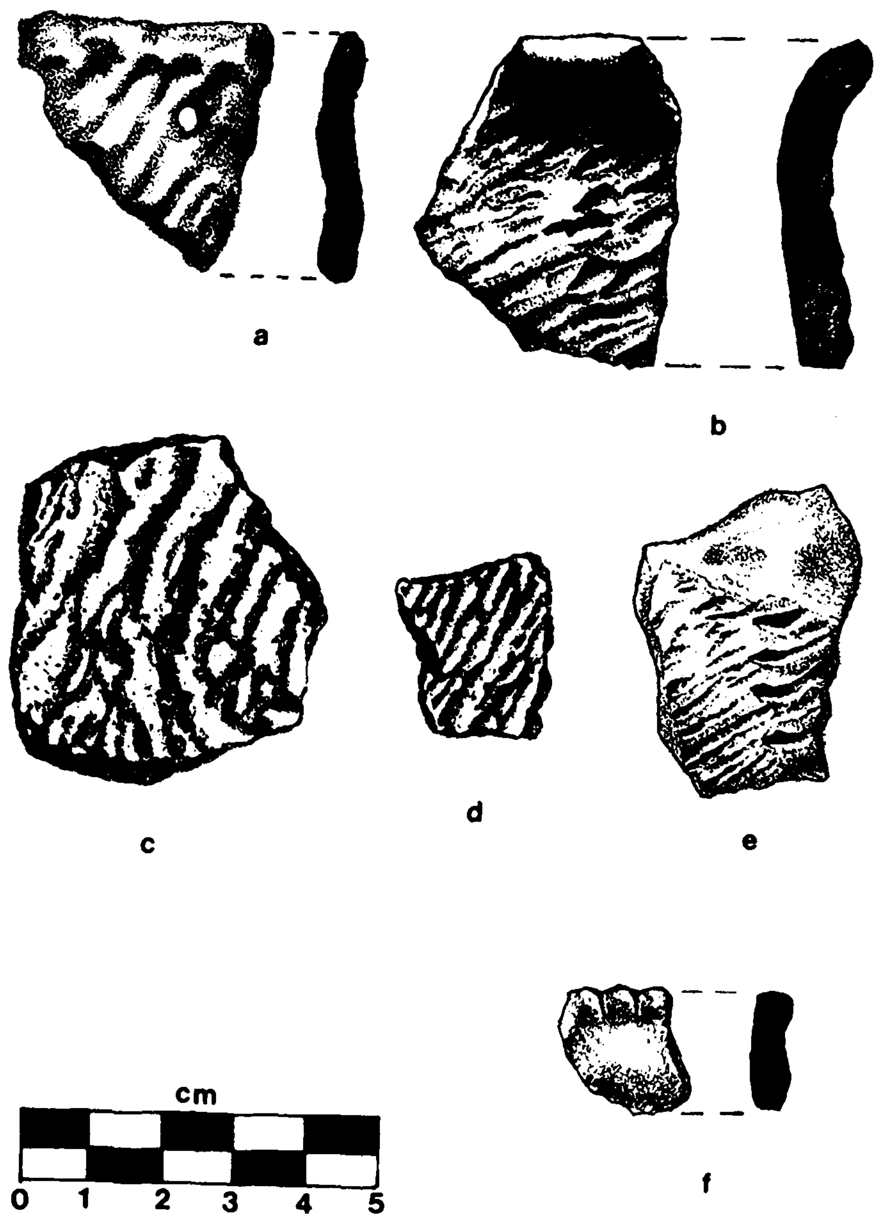


Figure 3.17 Pottery from 23JA36: (a-e) surface (f) A0001002.

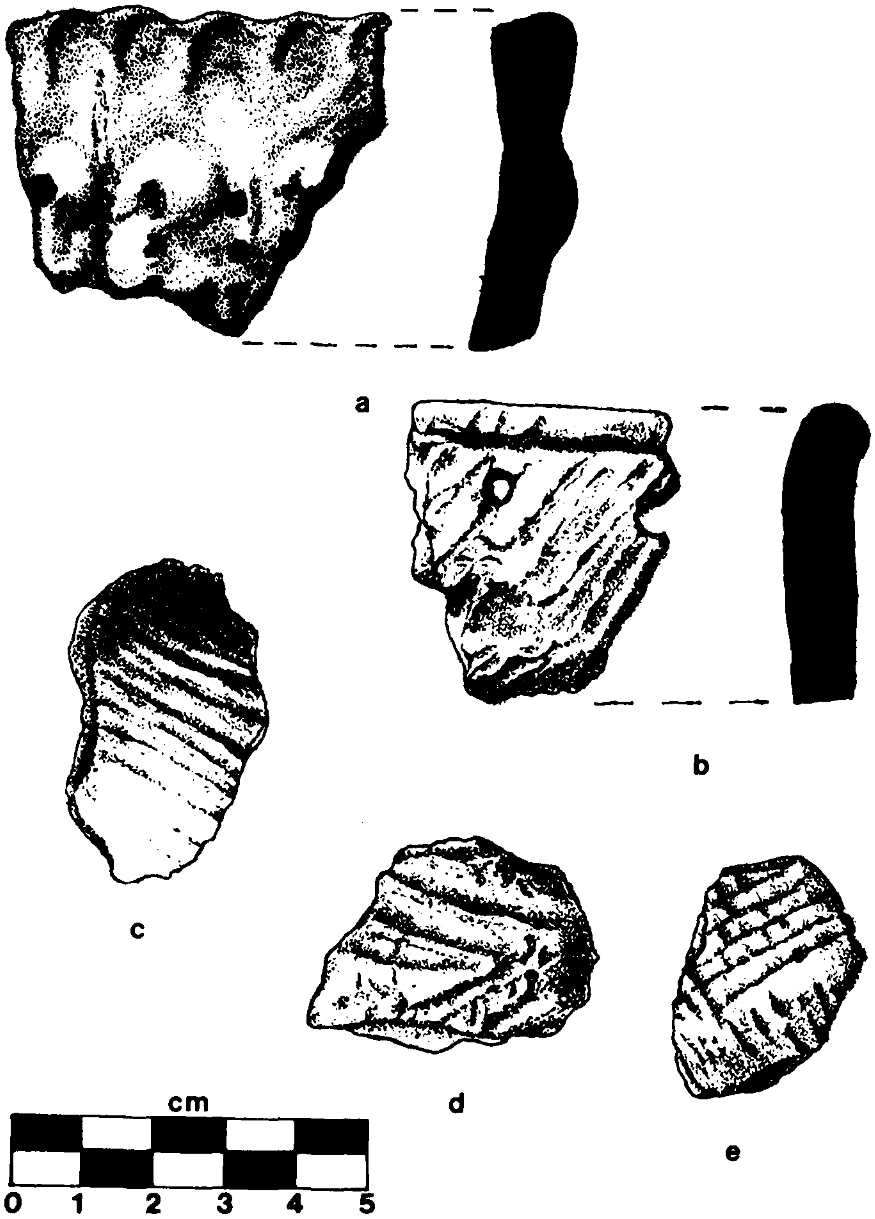


Figure 3.18 Pottery from 23JA36: (a) A0009377-1 (b) A0009377-2 (c) A0131577-1 (d) A0131577 (e) A0087677.

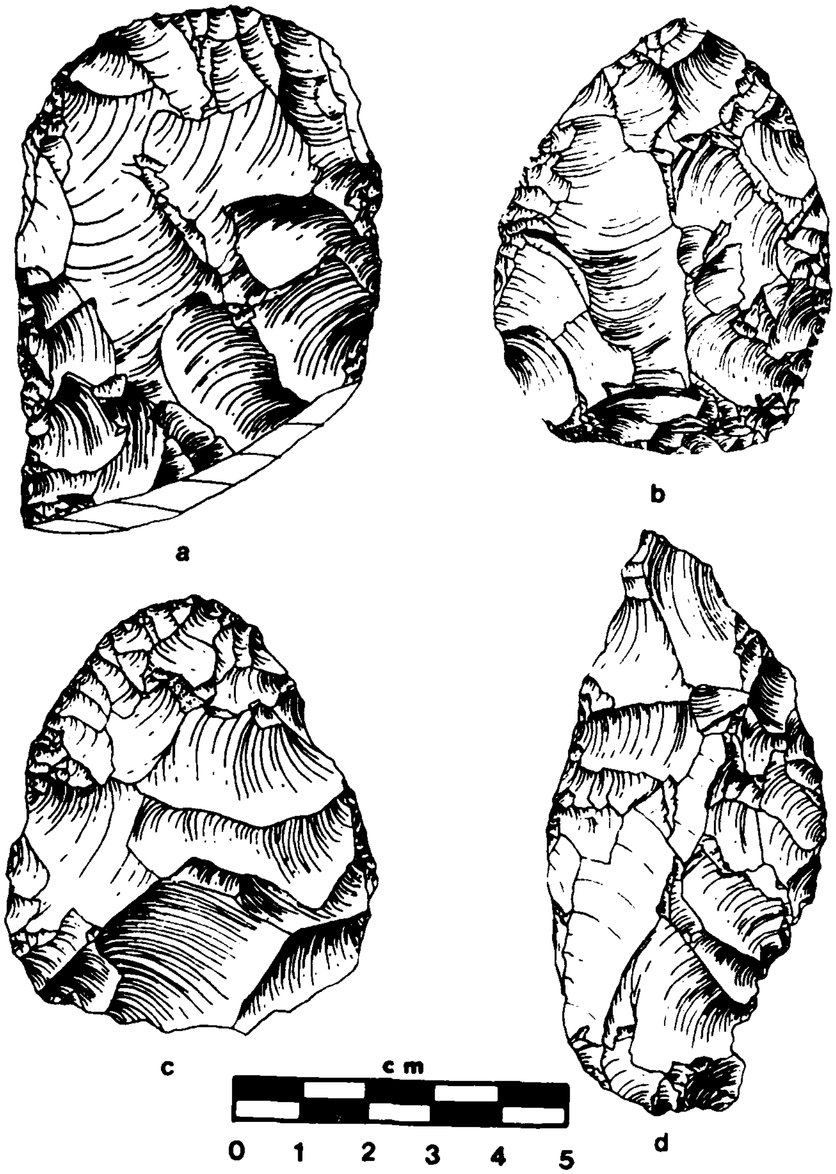


Figure 3.19 Preforms from 23JA36: (a-d) surface.

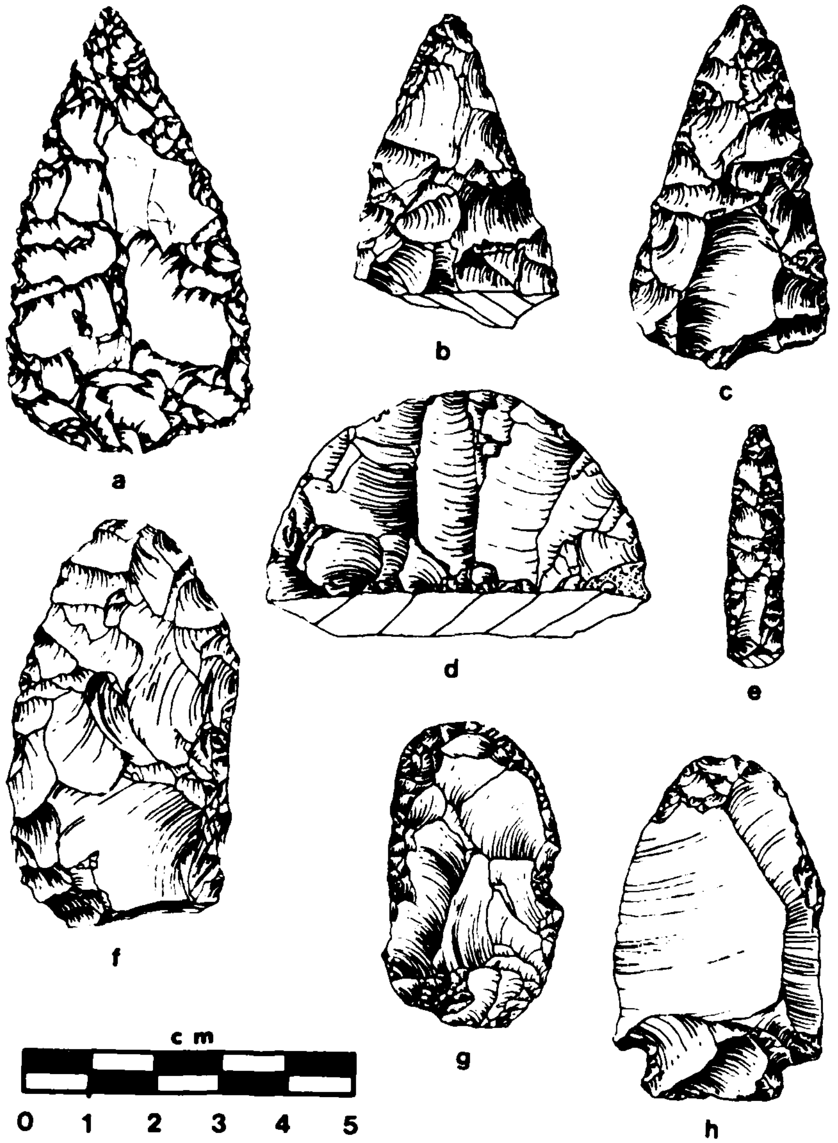


Figure 3.20 Invasively and marginally modified artifacts from 23JA36: (a) preform (A0011077) (b) knife (A0110577) (c) preform (A0133477) (d) scraper (A0127677) (e) drill (A008377) (f) knife (A0006877) (g) scraper (surface) (h) scraper (surface).

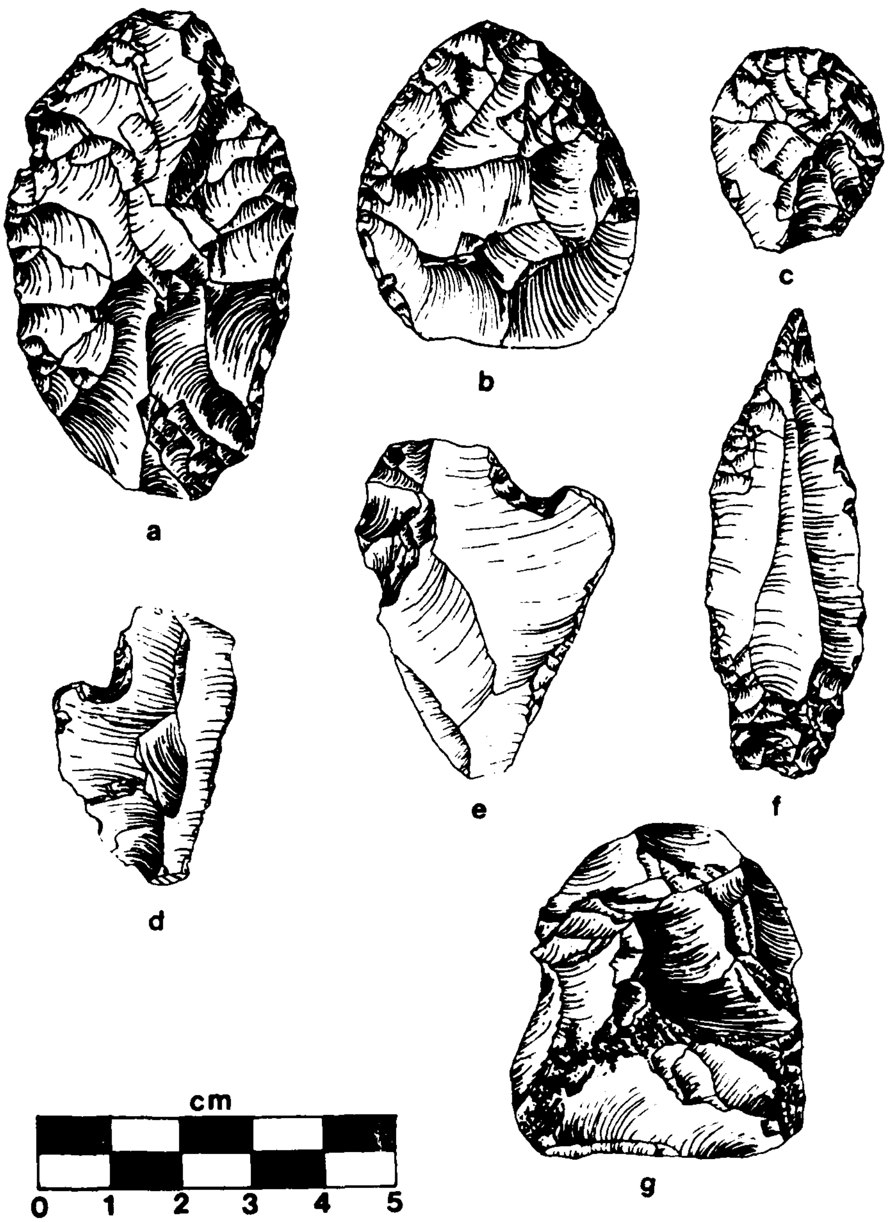


Figure 3.21 Invasively and marginally modified artifacts from 23JA36: (a) preform (surface) (b) scraper (surface) (c) scraper (A0096377-2) (d) notch (A090377-2) (e) notch (A0136377-1) (f) perforator (A0089977) (g) hammerstone (surface).

An inventory of artifacts recovered from the 1979 test excavations is presented in Table 3.6. Prehistoric artifacts consist of a small quantity of unmodified and modified chipped stone, and several pebble-size pieces of limestone. Modern artifacts include sewer gravel, glass and plastic. The predominance of the latter group indicates the disturbed nature of the right-of-way area.

Only one diagnostic artifact was recovered in 1979. It is a small triangular, side-notched projectile point (not shown) that dates to Late Woodland or Maybrook times. It was recovered in test 2 at a depth of five cm. below the bulldozed surface. Plastic was found at a level lower than the projectile point, indicating the disturbed nature of the deposits in this area.

23JA55

Background

Site 23JA55 is in the SE¼, NE¼, Section 29, T49N, R31W, on the U.S.G.S. 7.5 Minute Blue Springs Quadrangle. The site was formally recorded in 1965 by W. R. Wilson (Survey Sheet, Archaeological Survey of Missouri). At that time, the site covered approximately 7½ acres along the west bank of the Little Blue River. Subsequently, the farm on which the site was located has been converted into the Crackerneck Country Club golf course. In 1973, Mike Heffner of the Museum of Anthropology, University of Kansas, visited the site but could not locate any cultural debris (Heffner 1974:15). Based on grit-tempered pottery and large, notched projectile points recovered by Wilson, a Woodland cultural affiliation was suggested (Heffner 1974:16).

Surface Reconnaissance

A two member survey team examined site 23JA55 on July 5, 1978. A total of one man-day was required to examine the site. In areas parallel to, but at a distance of 10-20 m. or more from the river, construction of the golf course has eliminated all traces of the site (Fig. 3.22 a-b). At the time of survey, the heavily-timbered area along the river bank was partially cleared by a bulldozer. A careful inspection of this area produced only one artifact, a uniface. Based on the information gained during this reconnaissance, no further work was deemed necessary at 23JA55. The level of effort which would have been invested at 23JA55 was transferred to sites 23JA36 and 23JA40, since these two sites warranted additional work.

23JA79

Background

Site 23JA79 is in the SE¼, NE¼, Section 21, T49N, R31W on the U.S.G.S. 7.5 Minute Blue Springs Quadrangle. The site is situated on the second terrace of the Little Blue River (Fig. 3.23). Walter Klippel recorded the site in 1967 (Survey Sheet, Archaeological Survey of Missouri). Although the site had been extensively cultivated in the past, it had not been plowed at the time of the 1967 survey. Klippel collected a number of chert artifacts and several limestone-tempered sherds. In 1973, Mike Heffner of the Museum of Anthropology, University of Kansas, examined 23JA79. At that time, it was obscured by a dense

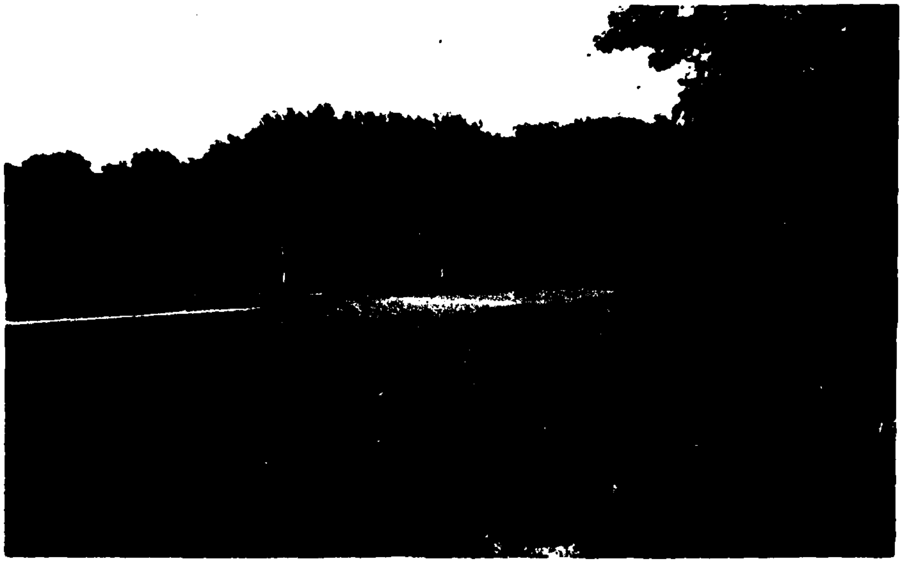


Figure 3.22 a. A portion of 23JA55 destroyed by Crackerneck Golf Course. Shown is tee 13, looking east.
b. Another destroyed portion of 23JA55. Shown is green 12, looking north.

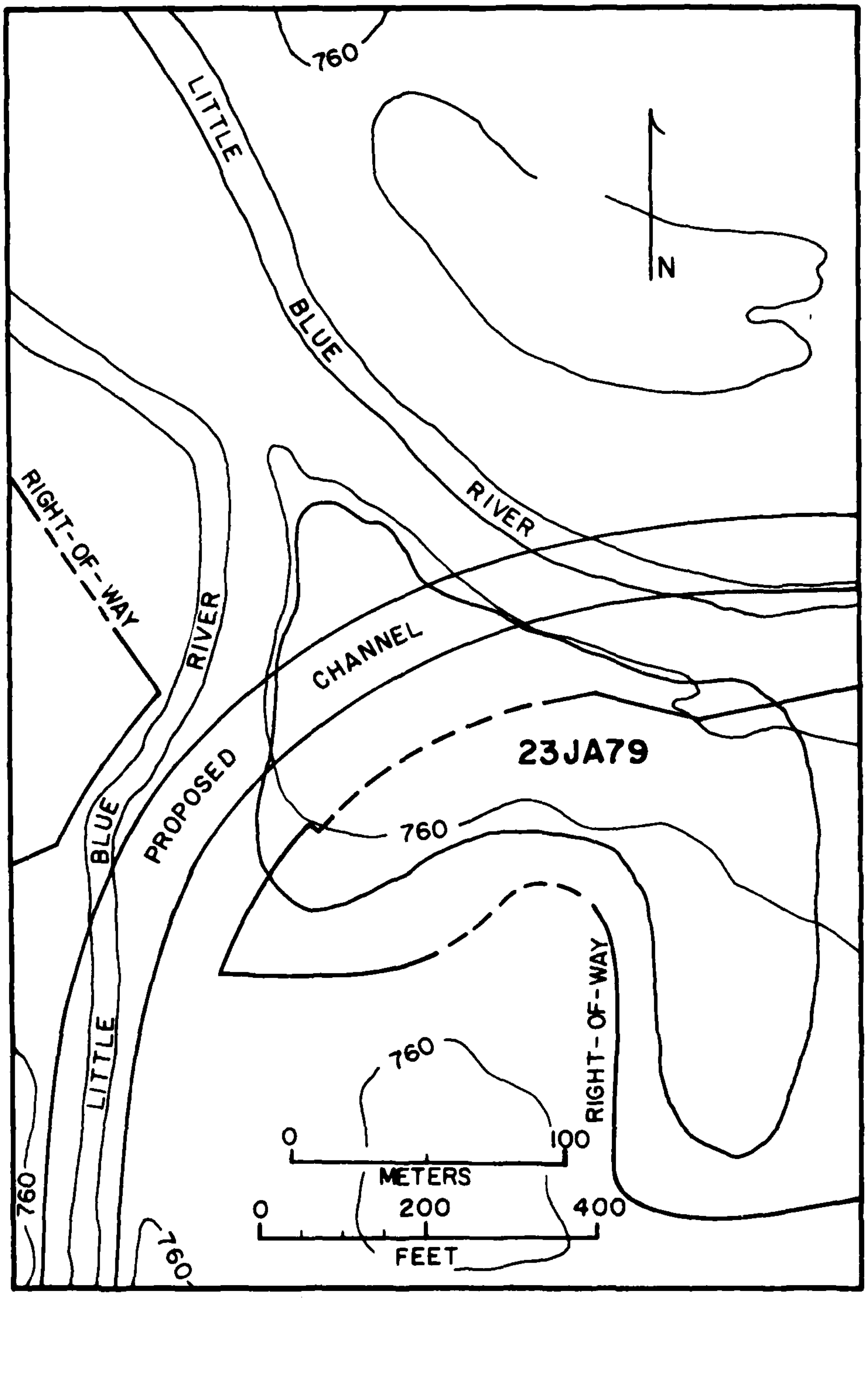


Figure 3.23 The location of site 23JA79 (see also Fig. 1.1).

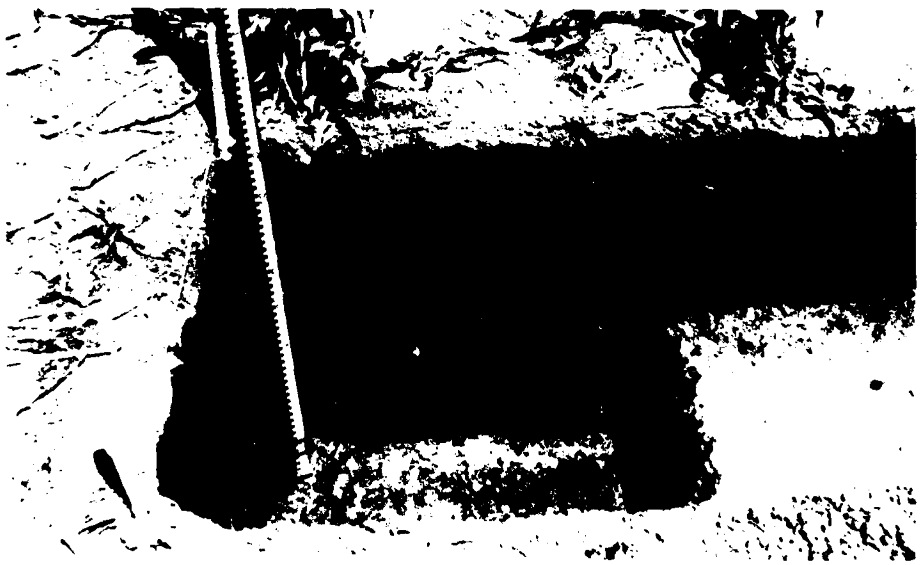


Figure 3.2   a. Site 23JA79, looking west at milo-covered portions of the site.
b. Test pit 9 at 23JA79.

cover of grass. No diagnostic artifacts were recovered (Heffner 1974:17).

During June 1 to June 7, 1977, a 21 person crew from the Museum of Anthropology conducted a surface-grab sample and test excavations at site 23JA79. A total of 105 man-days were required to test the site. Lithics, ceramics, and a small quantity of faunal and floral remains were recovered. No features were encountered. Diagnostic artifacts suggest a minimum of three components: Late Archaic, Late Woodland, and an occupation that post dates Late Woodland (either Steed Kisker or Maybrook).

Surface-Grab Sample

A surface reconnaissance of the site revealed that it covered approximately 24,500m^2; 20,000m^2 were planted in milo, while 4,500m^2 in the northwestern portion of the site were in grass (Fig. 3.24a). A complete inventory of items recovered from the surface is presented in Table 3.7. Selected artifacts are illustrated in Figs. 3.25-3.28.

Several projectile points from the surface of 23JA79 are difficult to place in time, and may represent occupations ranging from Middle Archaic through Early Woodland (Fig. 3.25c-f and Fig. 3.26 e-g). Artifacts which could positively be assigned to specific cultural-historical periods represent Late Archaic and Late Woodland components. Nebo Hill-like projectile points (Fig. 3.25 g-i) suggest a Late Archaic occupation. An additional point (Fig. 3.25b) is very similar to a specimen recovered from excavations at the Nebo Hill type site (23CL11) in Clay County Reid 1978:118). A small, corner-notched point (Fig. 3.25a) is similar to several specimens recovered from the Late Woodland component at the Sperry site (Chapter 5, this volume). Ceramics, discussed in a separate section below, also suggest a Late Woodland occupation.

Test Excavations

Prior to testing, a datum was established at the edge of the woods bordering the Little Blue River (Fig. 3.29). Tests were placed in both the cultivated and the grass-covered portions of the site to determine the nature and depth of cultural deposits (Fig. 3.29; test pits 7, 12, and 13 were in the grasscovered portion of the site). A grand total of 28m^2 was excavated to depths generally not exceeding 60 cm. below the present surface of the ground. To determine if any deeply-buried cultural deposits were present, test pit 9 was excavated to a depth of 1 m.; however, no cultural materials were found below 65 cm. Test pit 10 was expanded from an initial 1 x 2 m. size because several dark stains were present in the sides of the pit. Further excavation indicated that all were rodent disturbances.

Tests indicated two soil zones at 23JA79: 1. a 10YR3/2 (very dark greyish brown) silty clay plow zone extending to 22 cm. below surface; and 2. a 10YR3/3 (dark brown) clay. Of the total quantity of cultural debris recovered, about 65% came from the plow zone.

Chipped Stone

Of the 1976 artifacts recovered from test excavations at 23JA79, 1673 are chipped stone (Table 3.8). More than 90% of the chipped stone recovered, is the locally-available Winterset chert. Argentine, Burlington, and Westerville cherts are present in small quantities.

Fig. 3.30 shows the morphological classification of chipped stone from test excavations at 23JA79. From Fig. 3.30 it can be seen that flakes, more than any other blank type, were selected for further modifi-

Table 3.7

Artifacts Recovered from the Surface of 23JA79

Artifact Class/Code	Quantity
Pottery Sherds (10)	109
Projectile Points (20)	13
Bifaces (40)	50
Unifaces (50)	157
Cores (60)	18
Chunks (65)	133
Debitage (70)	1596
Worked Stone (80)	4
Unworked Stone (90)	12
Limestone (100)	179
Burned Earth (130)	10

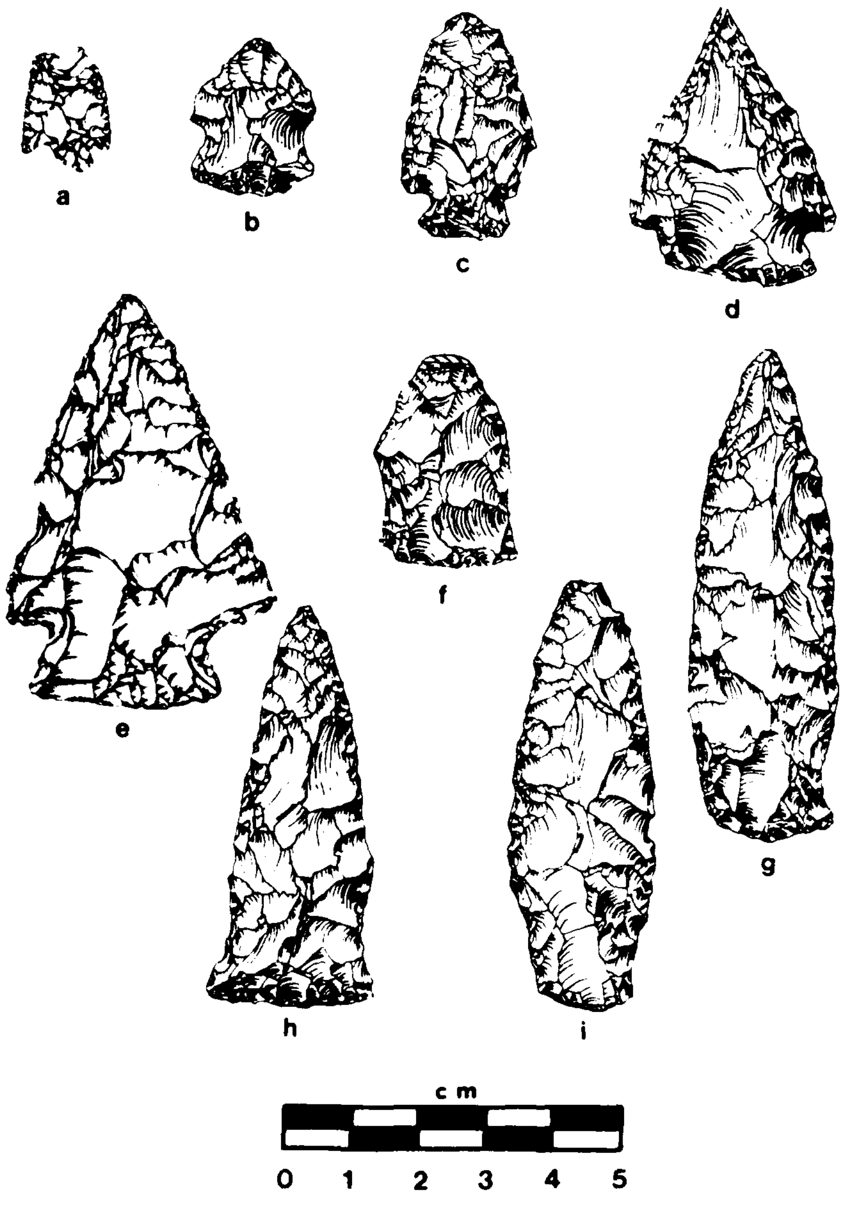


Figure 3.25 Projectile points from 23JA79: (a-i) surface.

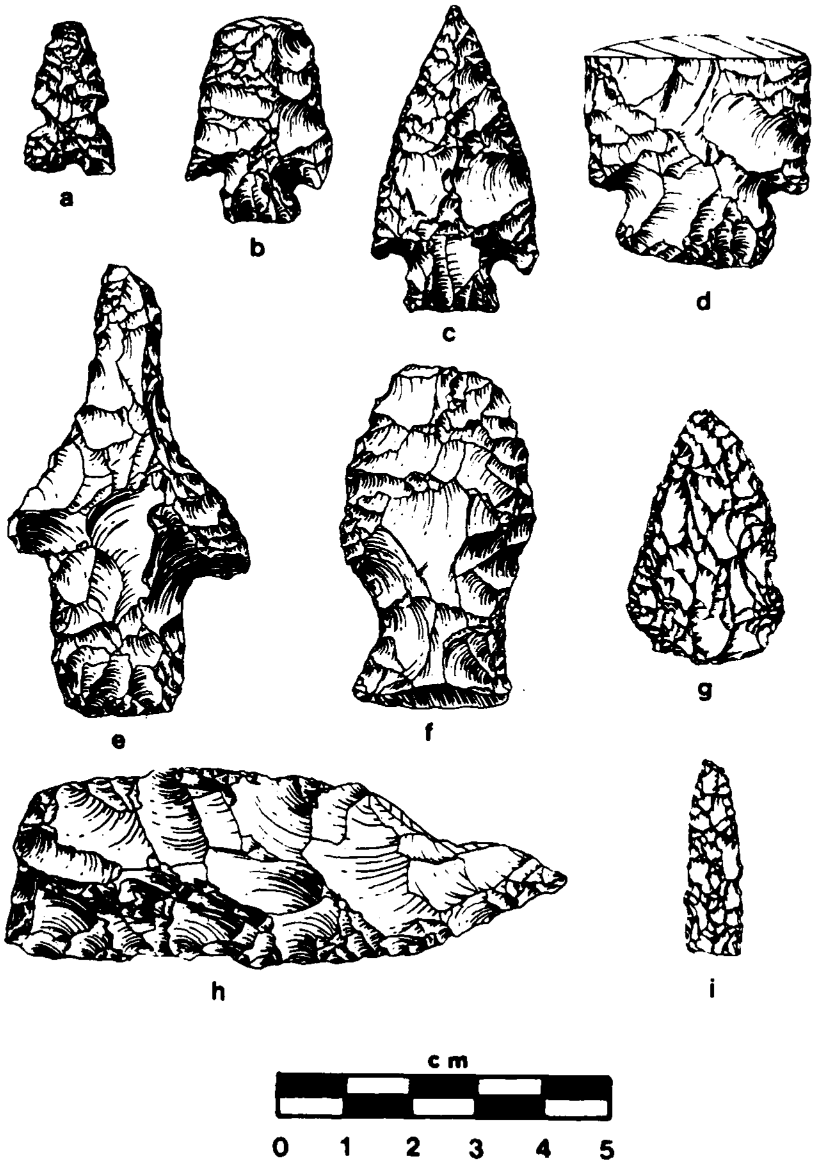


Figure 3.26 Invasively modified artifacts from 23JA79: (a) projectile point (A0010677) (b) projectile point (A0002377) (c) projectile point (A0001777) (d) projectile point (A0004877) (e-h) projectile points (surface) (i) drill (A0020177).

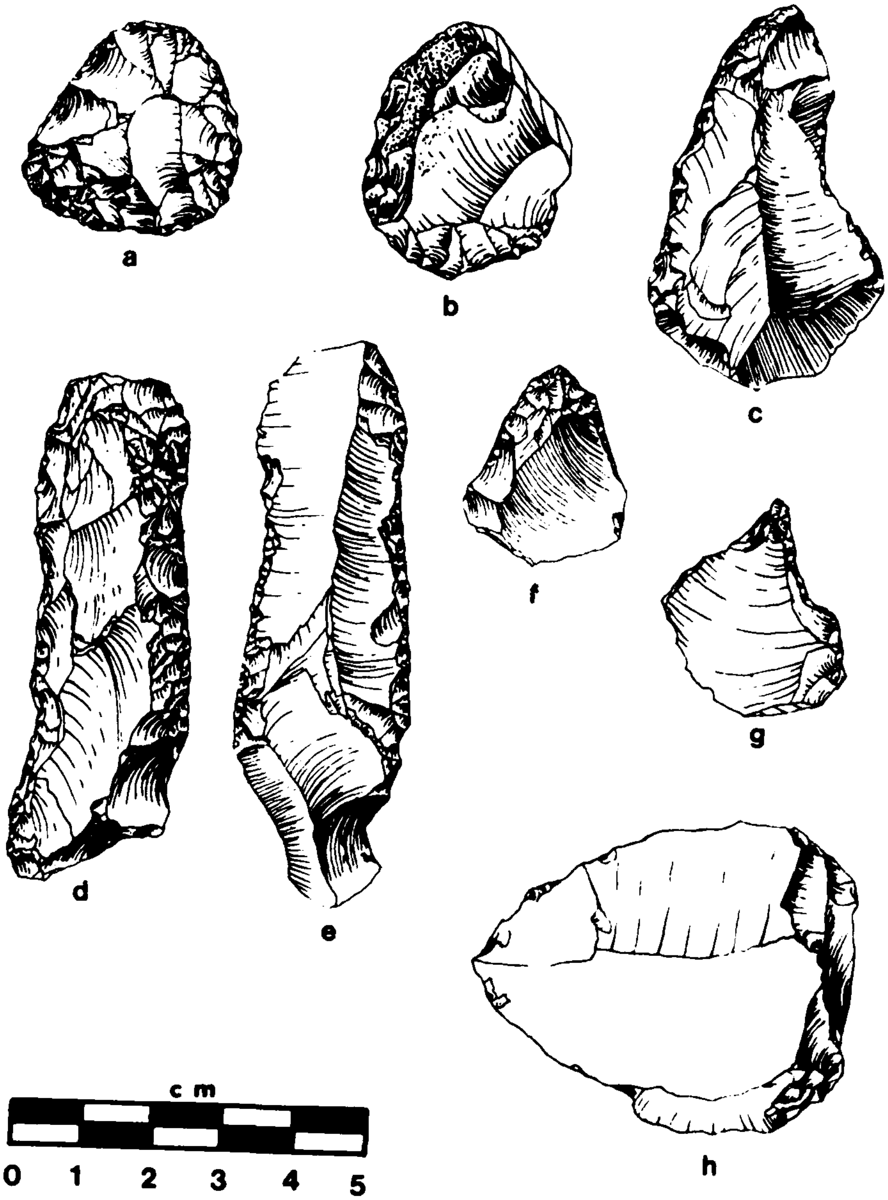


Figure 3.27 Invasively and marginally modified artifacts from 23JA79: (a-e) scrapers (surface) (f-g) perforarors (surface) (h) preform, showing the unworked cortical side (A0010777).

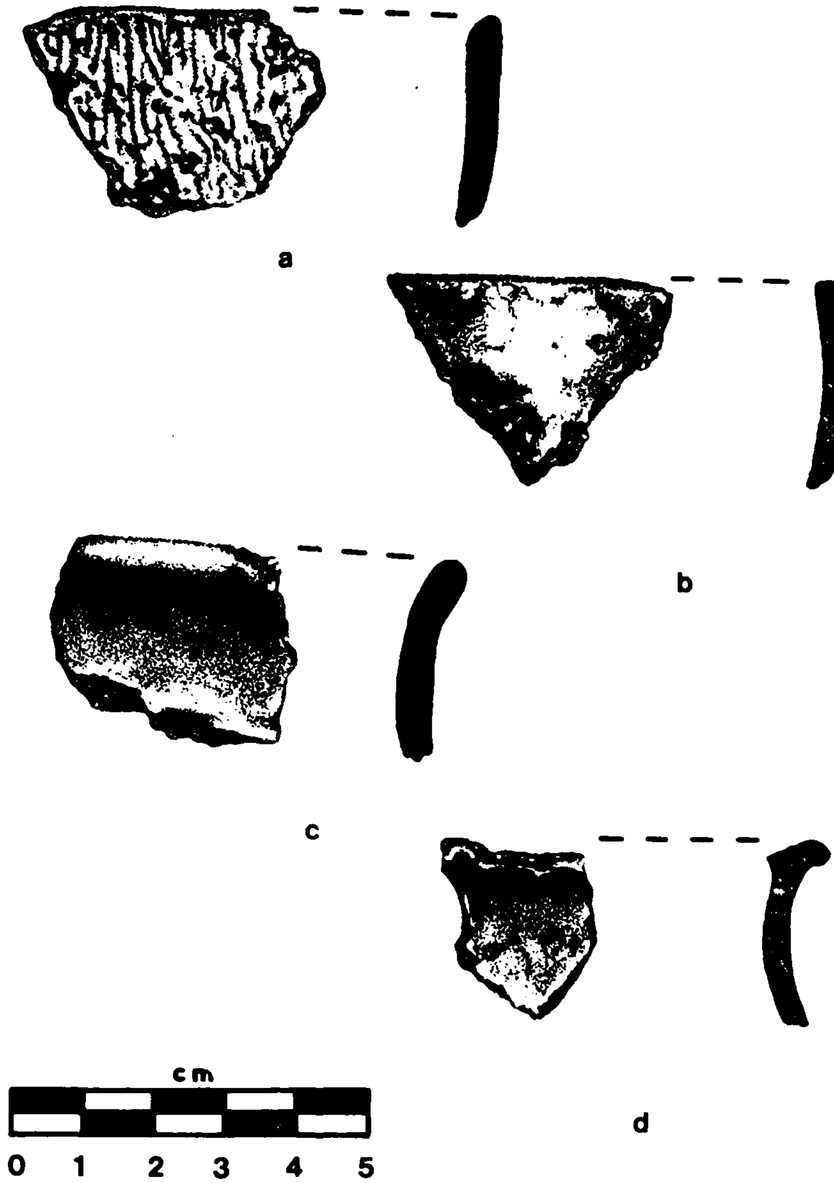


Figure 3.28 Pottery from 23JA79: (a-d) surface.

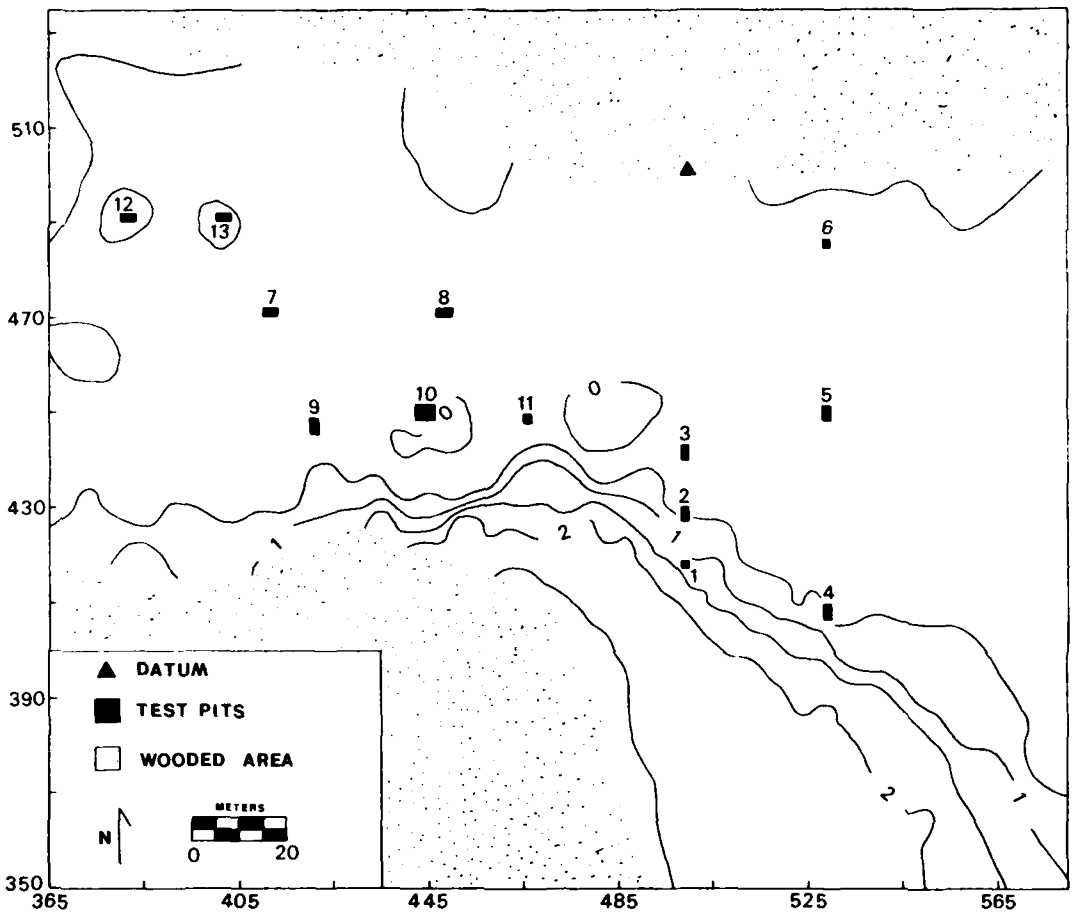


Figure 3.29 Contour map of 23JA79, showing the placement of datum point and test excavations. Contour lines are measured in .5 m. intervals *below datum elevation*.

Table 3.8

Artifacts Recovered from Test Excavations at 23JA79

Artifact Class/Code	Quantity
Chipped Stone	1673
Abrader (1020)	7
Hematite (1030)	13
Mano (1050)	1
Limestone (1070)	102
Unworked Stone (1080)	23
Burned Earth (1090)	54
Pottery (1100)	103

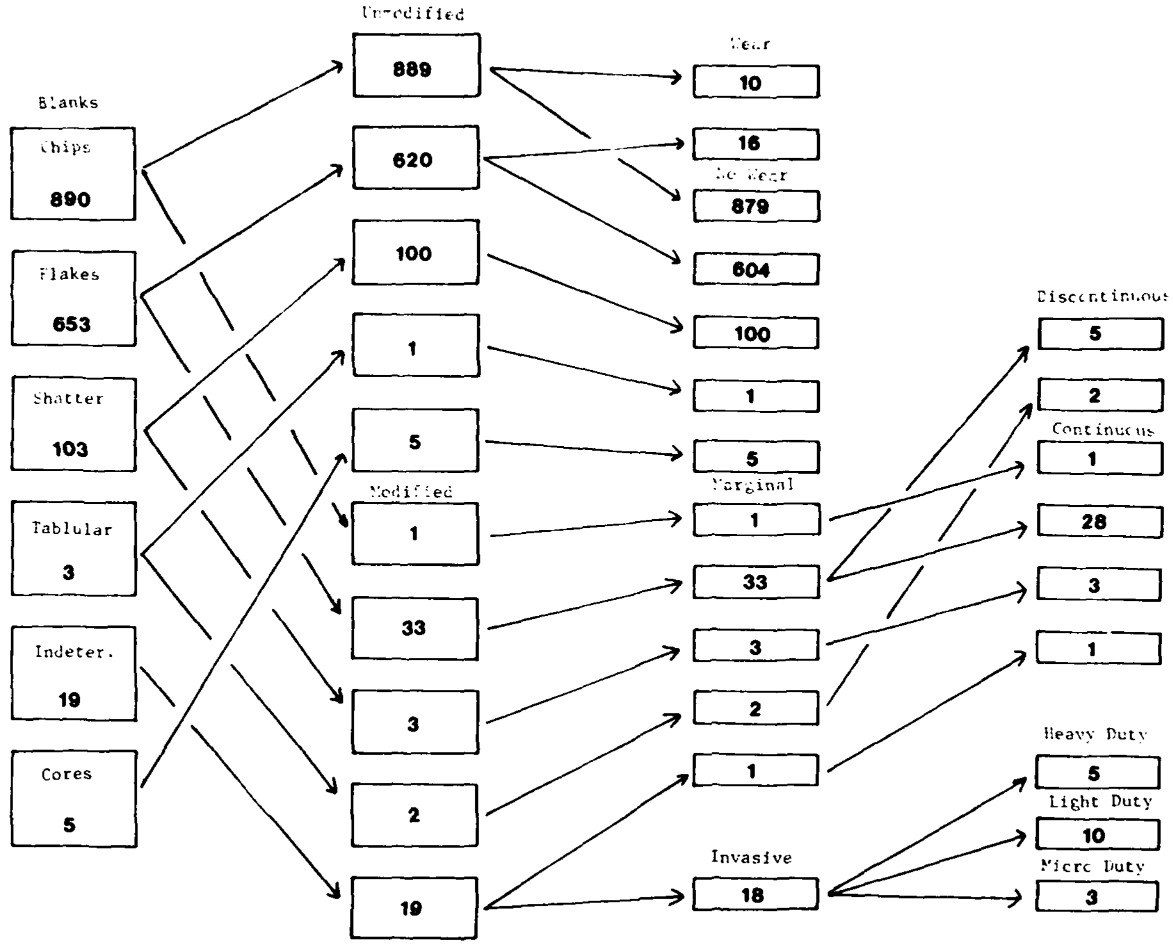


Figure 3.30 Hierarchical-morphological classification of chipped-stone artifacts from test excavations at 23JA79.

cation. No core tools are present, and only two tools were made on tabular blanks.

Only 58 artifacts exhibit modification. The majority of invasively-modified tools are small, being either micro or light duty (projectile points or knife/preforms). Of the 40 marginally-modified artifacts, only four have a distinct morphology, possibly suggesting they were specialized tools. These include two notches, one perforator, and a composite notch-perforator.

Excavated projectile points suggest a minimum of two components. A small, triangular, side-notched point (Fig. 3.26a) is post Late Woodland, dating from either Steed Kisker or Maybrook times. This specimen was recovered from the plow zone. Larger, corner-notched points (Fig. 3.26c-d), recovered between 30-35 cm. below surface, are suggestive of a Late Archaic occupation. The corner-notched point in Fig. 3.26b is difficult to place in time, since similar specimens are known to occur from Late Archaic through Late Woodland times. This specimen was recovered at 45 cm. below surface.

Tests indicate that a minimum of two, and possibly three, components are present in the northwestern portion of the site. The Late Archic points were recovered from tests 7 and 8 (Fig. 3.29), the post Late Woodland point from test 13, and the unidentifiable point from test 12.

Ceramics

A total of 103 sherds were recovered from test excavations at 23JA79. Of these, 81% came from the plow zone. A preliminary examination of attributes such as surface treatment and temper showed that sherds from the plow zone did not differ markedly from those with plow zone proveniences. In addition, the collection of sherds from the surface was very similar to the excavated group. Therefore, surface and subsurface collections were combined and treated as one. Of this total collection of 212, many specimens were so fragmentary that the precise identification of attributes was nearly impossible. Thus, only the larger sherds, i.e., those having a minimum of 15 mm^2 of surface area on both exterior and interior surfaces, were selected for further examination. Using this criterion, the sample was reduced to 70 specimens.

Selected attributes of the sample are presented in Table 3.9. Temper was examined with the aid of a 7-30x binocular microscope. In addition to tempering agents, nearly all of the sherds from 23JA79 exhibited hematite and sand, natural paste inclusions.

Ceramics from 23JA79 exhibit attributes that are characteristic of the Late Woodland period. They have plain or cordmarked exterior surfaces, and predominately crushed granite or sherd temper. A direct comparison can be made with the radiocarbon-dated Late Woodland component at the Sperry site (See Brown, this volume). At Sperry, plain sherds comprise 78% of the sample, while 94% at 23JA79 are plain surfaced. The remainder at each site consists only of cordmarked sherds. Crushed granite and sherds were the most frequently occurring tempering materials at both sites.

Other Artifacts

Artifact types, other than chipped stone or ceramics, are listed in Table 3.8. Two of these categories deserve further mention. Although no hearths were recognized, a fairly large quantity of burned earth and fire-reddened limestone was recovered. Most of the burned earth and limestone was confined to the plow zone, and thus it is likely that

Table 3.9

Attributes of 23JA79 Ceramics
n=70

Attribute	Quantity	Percent
Exterior Surface Treatment:		
Plain	66	(94.3)
Cordmarked	4	(5.7)
Temper:		
Crushed Granite	20	(28.6)
Sherd	13	(18.6)
Sand	10	(14.2)
Crushed Granite and Sherd	8	(11.4)
Sand and Sherd	8	(11.4)
Indurated Clay	7	(10.0)
Sand and Crushed Granite	3	(4.3)
Indurated Clay and Sand	1	(1.4)

Color:	Exterior	Interior	Core
Buff	42 (60.0)	24 (34.3)	6 (8.6)
Brown	25 (35.7)	37 (52.9)	38 (54.3)
Grey	3 (4.3)	9 (12.9)	26 (37.1)

repeated plowing has destroyed the structural aspect of hearths and scattered their contents about.

Faunal Remains

Six fragmentary bones were recovered from test excavations at 23JA79. Only one of these, a carpal bone fragment of a deer (*Odocoileus* sp.), was identifiable.

Floral Remains

Identifiable floral remains recovered from test excavations at 23JA79 are listed in Table 3.10. Seeds representative of genera which prefer waste areas or disturbed ground (*Amaranthus*, *Chenopodium*, and *Portulaca*), far outnumber those which prefer other habitats (Jones and Bell 1974:1-11).

Charred floral remains which represent edible resources include *Amaranthus* seeds and *Carya* nuts. From this limited data, it appears that the prehistoric inhabitants were exploiting flora in the immediate vicinity of the site. Amaranthus would have grown well in disturbed waste areas within the site, while Carya would have been procured from the nearby floodplain forest. *Amaranthus* seeds are available from September-November (Zawacki and Hausfater 1969:49). *Carya* are available during September and October (Zawacki and Hausfater 1969:32).

The Carya shell fragments appear to have been associated with one of the earlier components, since all were found at a depth of 47 cm. below the present surface of the ground.

Summary And Conclusions

Artifacts recovered from the surface and subsurface suggest that 23JA79 was occupied several times. Ceramics, representing a Late Woodland occupation, are either plain or cordmarked with crushed granite or sherd temper. Projectile points suggest Late Archaic, Late Woodland, and post Late Woodland (Steed Kisker or Maybrook) components.

It is not possible to define precise horizontal limits of the various occupations. However, limited data from test pits does indicate that two, or possibly three, components are present in a small area of the northwestern portion of the site. It is not known whether other portions of the site represent one large occupation or several smaller ones.

Artifacts suggest that a number of procurement and maintenance tasks were conducted at 23JA79. A large quantity of lithic debris indicates that tool manufacturing was an important activity. Other activities inferred are hunting, butchering, hide working, and food preparation.

A late summer or fall occupation is postulated for 23JA79. Edible resources recovered include *Amaranthus* seeds and *Carya* nuts. Both of these are available from late summer into the fall. Furthermore, it is unlikely, due to river flooding, that 23JA79 would have been occupied during the spring and early summer months.

23JA80

Background

Site 23JA80 is in the NW¼, SE¼, of Section 16, T49N, R31W, on the U.S.G.S. 7.5 Minute Blue Springs Quadrangle. The site is situated on a slope and second terrace along the east bank of the Little Blue River (Fig. 3.31). In 1967, Walter Klippel recorded 23JA80 (Survey Sheet,

Table 3.10

Floral Remains from 23JA79

Family	Genus	Common Name	Charred	Some Charred	Not Charred	?
Amaranthaceae	Amaranthus	Pigweed		100	18	
Chenopodiaceae	Chenopodium	Goosefoot				2
Juglandaceae	Carya	Hickory	100+frags			
Poaceae	Unknown	Grass Family	1			
Portulacaceae	Portulaca	Purslane			5	50

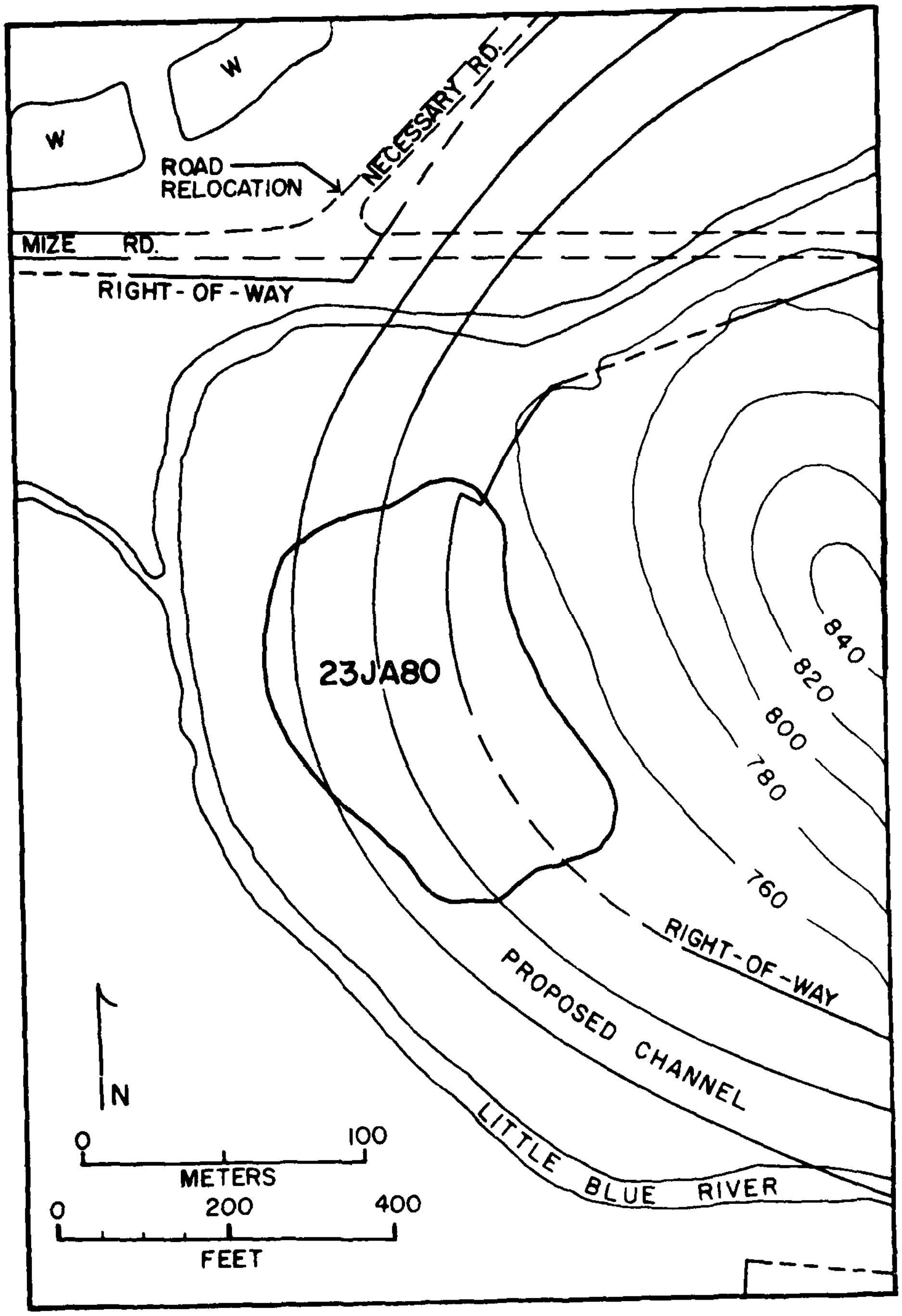


Figure 3.31 The location of site 23JA80 (see also Fig. 1.1).

Archaeological Survey of Missouri). Klippel collected a number of lithic artifacts from the plowed surface of the site, including one complete projectile point and one base fragment of a projectile point. No cultural affiliation was suggested by Klippel, nor was an estimate made of the size of the site. In 1973, Mike Heffner of the Museum of Anthropology, University of Kansas, surveyed 23JA80. At that time, the site was covered by dense vegetation, thereby obscuring all surface indications (Heffner 1974:17).

During June 6 to June 15, 1977, a ten person crew conducted test excavations at site 23JA80. A total of 80 man-days were required to test the site. Lithics, ceramics, and a small quantity of faunal and floral remains were recovered. Two features were encountered, though neither contained enough charcoal for a radiocarbon determination. Based on diagnostic artifacts 23JA80 appears to be a single-component Late Woodland site.

Test Excavations

Prior to testing, a datum was established in a fence-row (Fig. 3.32). The site was in fescue grass at the time, thereby obscuring all surface indications (Fig. 3.33a). Initially, tests were placed on high ground (Fig. 3.32, test pits 1-4) to determine the nature and depth of deposits there. Later, additional tests were placed in this area. In order to determine the areal extent of the site, tests 5, 6, 7, and 11 were placed on the first and second terraces (Fig. 3.32).

A grand total of $29m^2$ was excavated. Lithic and ceramic artifacts indicate that the most intensively occupied portion of the site was on high ground near datum point. The nine test pits in this area of $1{,}600m^2$, produced most of the artifacts as well as two features. Very little cultural debris was recovered from the tests placed on the first and second terraces. One test (test pit 11) was excavated to 1.10 m. below surface to make sure there were no deeply-buried deposits; no cultural debris was found below 20 cm. from the present surface of the ground.

Tests indicated three soil zones at 23JA80: 1. a 7.5YR3/2 (dark brown) silty clay plow zone extending to 20 cm. below surface; 2. a 10 cm. thick 10YR3/3 (dark brown) clay loam; and 3. a 10YR3/1 (very dark grey) clay. Cultural debris was concentrated in the first two zones, that is, within 30 cm. of the present surface of the ground.

Features

Feature 1, a disturbed hearth, was centered at 472.50 east and 486.50 north. It consisted primarily of several scattered pieces of fire-reddened limestone (Fig. 3.34a). The limestone was located between 25-27 cm. below surface, and was concentrated in an area measuring 1.15 m. in diameter. The feature had no distinct outline; only a few, light amorphous stains suggested the presence of organic materials. A few small flecks of charcoal, a small quantity of burned earth, and a small quantity of charred and uncharred seeds (mostly *Amaranthus*) were also recovered from the feature.

In addition to lithic debitage, several other artifacts were in close proximity to feature 1; all were located from 22-29 cm. below the present surface of the ground. These include three potsherds, two marginally-modified flakes, and one granite mano. Considering the sherds, one is cordmarked (Fig. 3.36k) while the others have plain exterior surfaces. The cordmarked sherd is sand tempered. One plain-

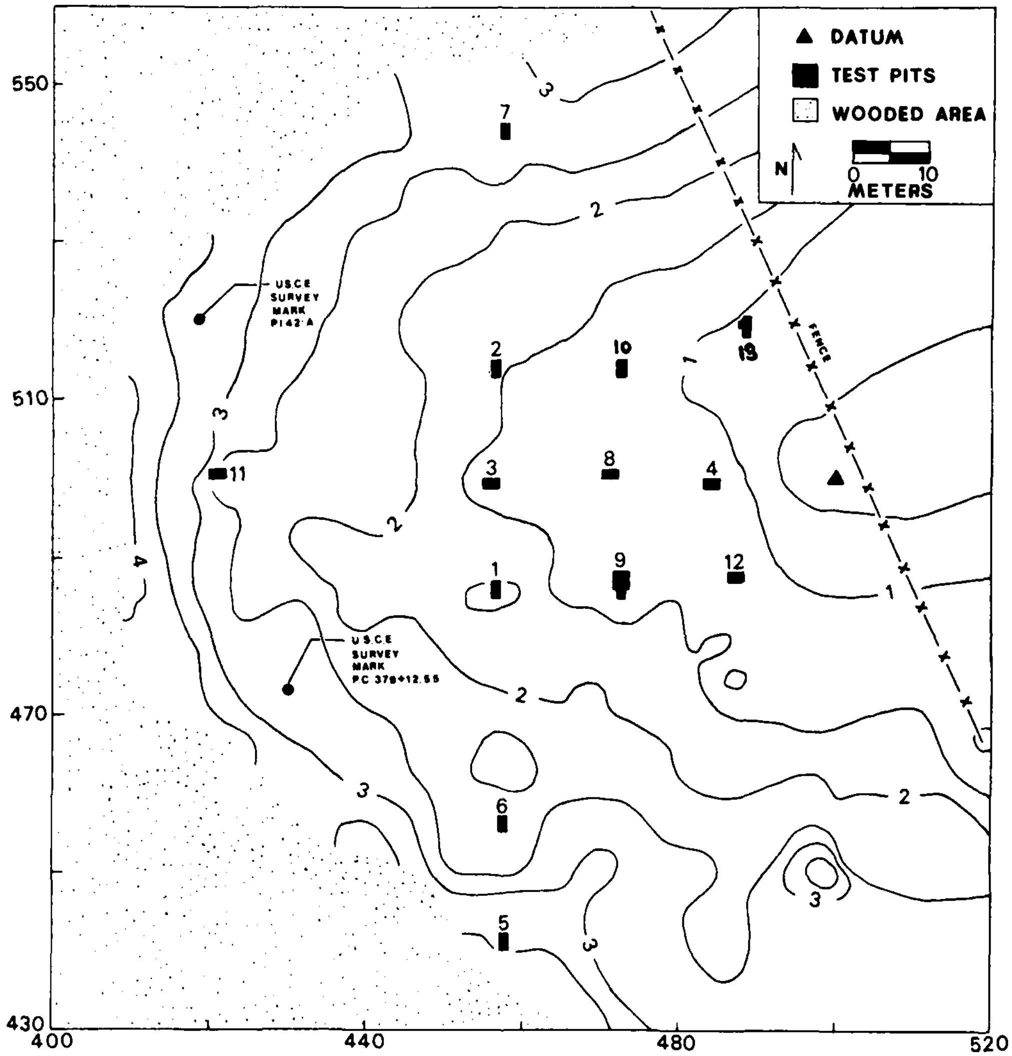


Figure 3.32 Contour map of 23JA80, showing the placement of datum point and test excavations. Contour lines are measured in .5 m. intervals below datum elevation.

Figure 3.33 a. View of 23JA80, taken from slope east of site.
b. Testing at 23JA80, looking west from datum point.

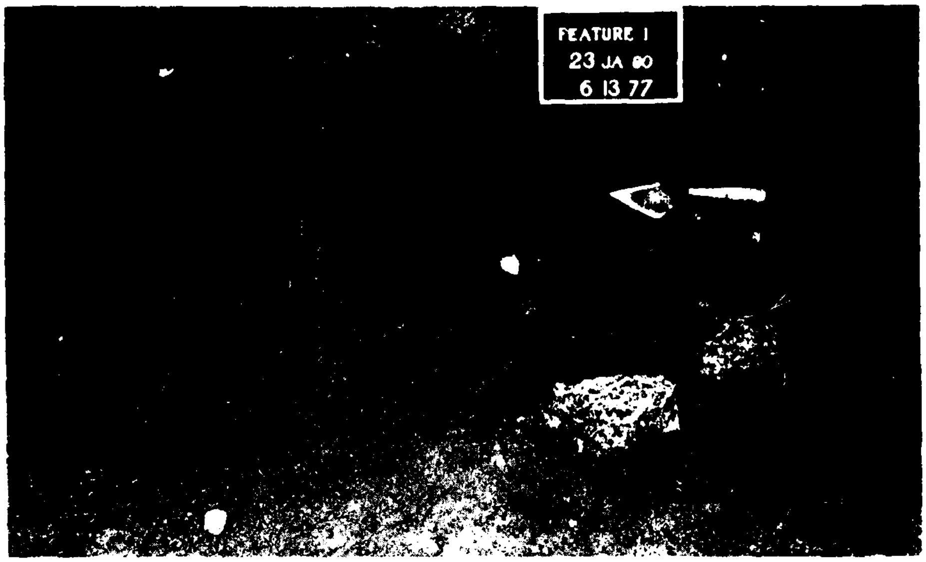


Figure 3.34 a. Feature 1 at 23JA80.
b. Feature 2 at 23JA80.

surfaced sherd is granite tempered, while the other is granite and sherd temper combined. Carbon streaks are present on all three specimens.

Feature 1 is interpreted to have been a rock hearth. There is no convincing evidence of a pit, thus it is suggested that pieces of limestone were placed directly on the ground, forming an open type hearth rather than an earth oven (Binford et al. 1970:42-58). Except for the limestone, there is very little evidence of burning. Being exposed to the elements, it is quite possible that the contents of feature 1 were washed away by slope runoff, or flooding of the Little Blue River. Additionally, pieces of limestone may have been removed by the prehistoric inhabitants for other uses.

Feature 2, a hearth, was centered at 486.26 east, 521.14 north. It consisted of a concentration of fire-altered limestone, and small quantities of charcoal and burned earth (Fig. 3.34b). The main concentration of limestone was located at 25 cm. below surface and measured 46 x 34 cm. There was no discrete soil stain associated with the feature. Feature 2, like feature 1, was probably an open-type hearth. Several pieces of limestone had been removed from the main cluster (Fig 3.34b).

Artifacts directly associated with feature 2 include a marginally-retouched flake, and a potsherd. Both were located less than 25 cm. from the main concentration of limestone. The sherd has a plain exterior surface, crushed granite temper, and a carbon streak.

Chipped Stone

More than 4,000 artifacts were recovered from 23JA80; of these, 2,526 are chipped stone (Table 3.11). More than 90% of the chipped stone recovered, is the locally-available Winterset chert. Argentine, Burlington, and Westerville cherts are present in small quantities. Of particular interest are two chips of Knife River Flint. This molasses-colored chalcedony is not locally available, and in fact, is known to occur only along the Knife River in Mercer County, North Dakota (Clayton, Stone, and Bickley 1970).

Fig 3.35 shows the morphological classification of chipped stone from 23JA80. It is obvious that flakes, more than any other blank type, were selected for further modification. No core tools are present, and only one tool was made on a tabular blank.

Considering modification, only six of the 51 marginally-modified specimens have a distinct morphology, possibly suggesting that they were specialized tools. Five were classified as notches (Fig. 3.36h-i) and one as a perforator. The majority of invasively-modified tools are small, being either micro or light duty. Most are knives or preforms (Fig. 3.36 3-g). One specimen (Fig 3.36d) appears to have been a lanceolate or contracting stemmed projectile point which broke and subsequently was resharpened into a perforator.

Three specimens are classified as projectile points. One (Fig. 3.36a) has two shallow corner-notches, while the others (Fig. 3.36b-c) each have only one notch. Small, asymmetrical, corner-notched and unnotched points are characteristic of the Late Woodland period (Chapter 1, this volume).

Ceramics

A total of 106 sherds was recovered from test excavations at 23JA80. Only two are rimsherds; one of these has a plain exterior surface while the other is cordmarked. Many specimens were so fragmentary that the identification of attributes was difficult or even impossible. There-

Table 3.11

Artifacts Recovered from Test Excavations at 23JA80

Artifact Class/Code	Quantity
Chipped Stone	2,526
Hematite (1030)	193
Mano (1050)	1
Limestone (1070)	550
Unworked Stone (1080)	538
Burned Earth (1090)	105
Pottery (1100)	106
Modern (2000)	13

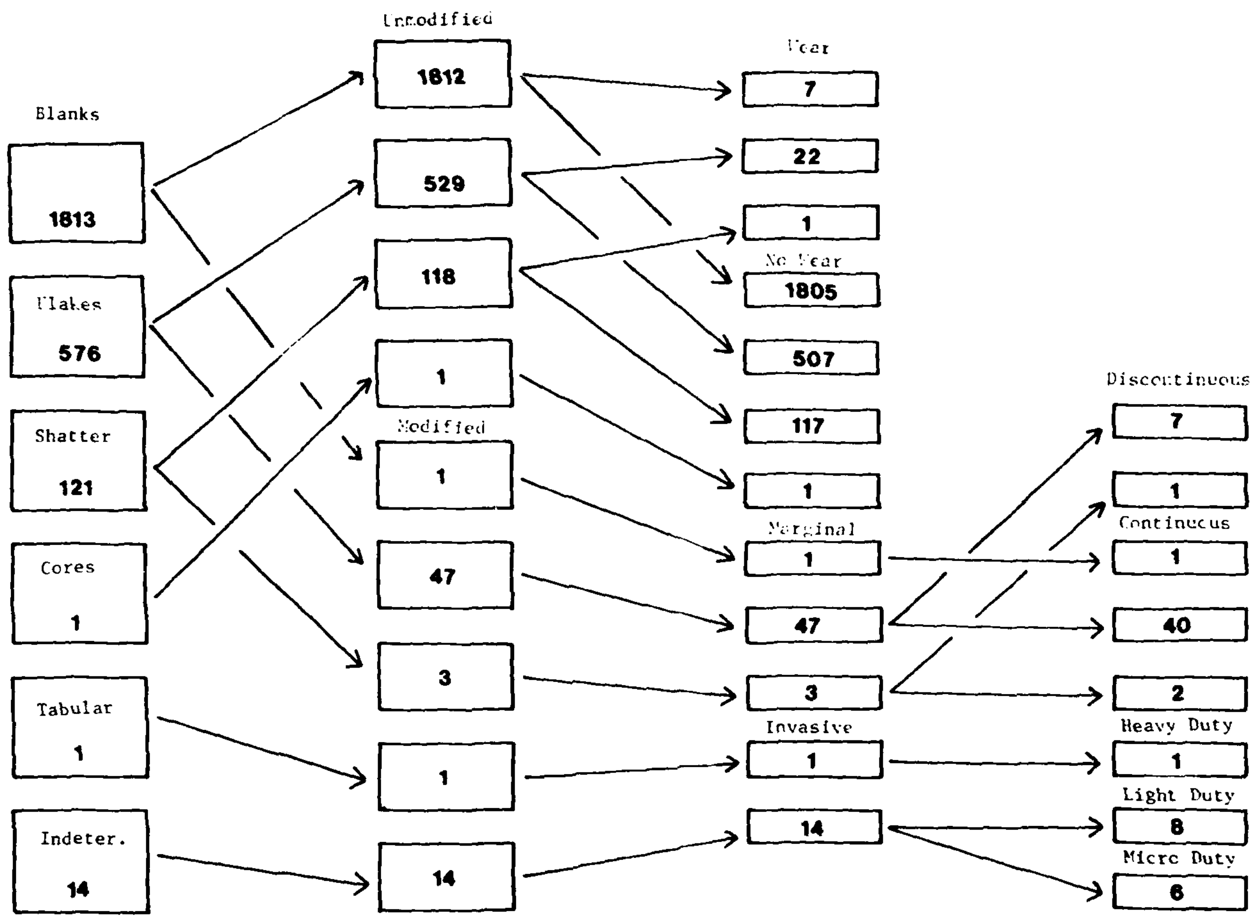


Figure 3.35 Hierarchical-morphological classification of chipped-stone artifacts from 23JA80.

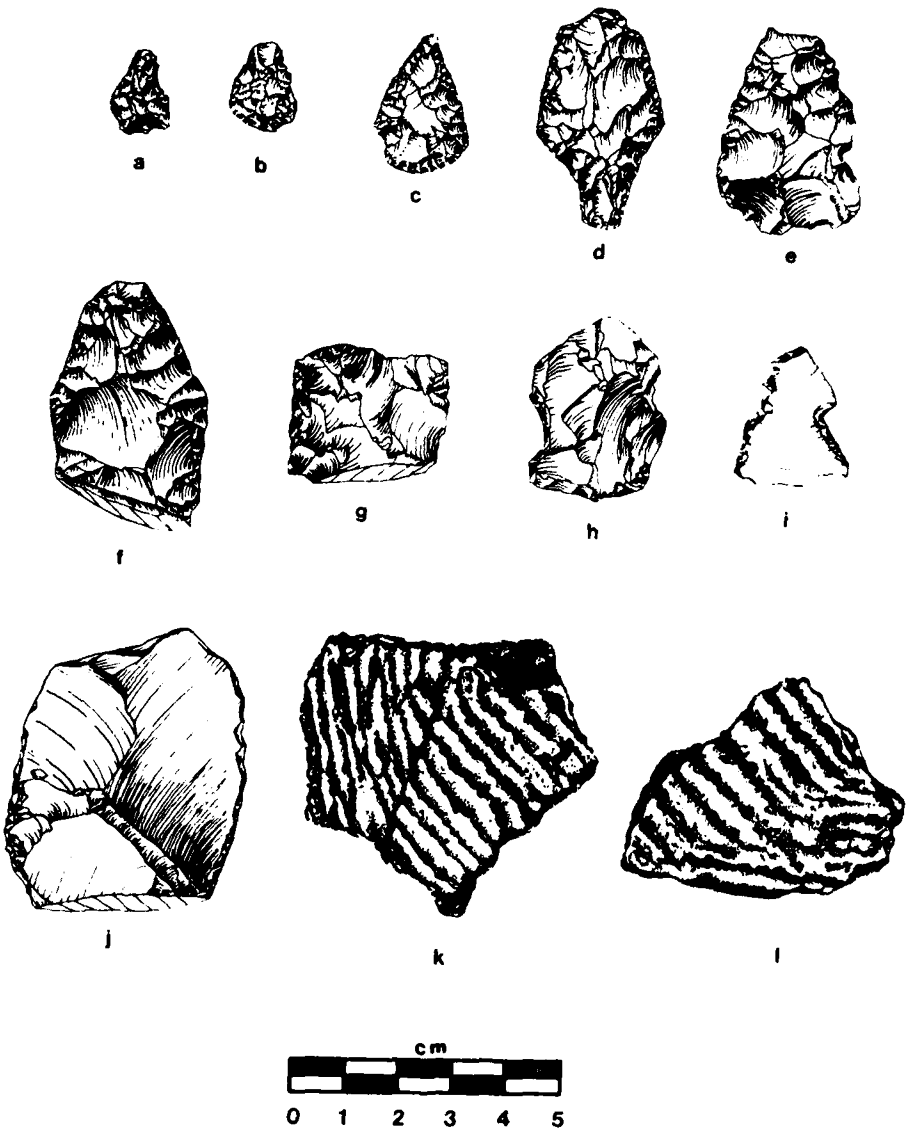


Figure 3.36 Artifacts from 23JA80: (a) projectile point (A0051277) (b) projectile point (A0034077) (c) projectile point (A0059677) (d) perforator (A0064177) (e) preform (A0058077) (f) knife (A0033377) (g) knife (A0031377) (h) notch (A0034677) (i) notch (A0057677) (j) scraper (A0034877-1) (k) sherd(A0046977) (l) sherd (A0041977-1).

fore, only the larger sherds, i.e., those having a minimum of 15mm² of surface area on both interior and exterior surfaces, were selected for further examination. Selected attributes of this reduced sample (35) are presented in Table 3.12. Temper was examined with the aid of a 7-30x binocular microscope.

Ceramics from 23JA80 exhibit attributes that are characteristic of the Late Woodland period. They have plain or cordmarked exterior surfaces and predominately crushed granite or sherd temper. Direct comparisons can be made with the Late Woodland component at the Sperry site (see Brown, this volume). At Sperry, plain sherds comprise 78% of the sample, while 83% of the sherds at 23JA80 are plain. The remainder of each sample consists only of cordmarked sherds. Crushed granite and sherds were the most frequently occurring tempering materials at both sites.

Other Artifacts

Artifact types, other than chipped stone or ceramics, are listed in Table 3.11. Hematite, limestone (except for those in features 1 and 2), and unworked stone generally consisted of small pieces, pebble-size or smaller. Burned earth, occurred in small pieces, widely scattered throughout the site.

Faunal Remains

Sixteen fragmentary bones were recovered from 23JA80. Only one of these, a vertebra fragment of the American toad (*Bufo americanus*), was identifiable.

Floral Remains

Identifiable floral remains recovered from 23JA80 are listed in Table 3.13. The plants represented, with the exception of Poaceae, are genera which prefer waste places and disturbed ground habitats (Jones and Bell 1974:1-11). Of the charred remains, *Amaranthus* is an edible genus. These seeds are available from September to November (Zawacki and Hausfater 1969:49).

Summary And Conclusions

Site 23JA80 fits the characteristics attributed to the Late Woodland period (Chapter 1, this volume). Projectile points are small, asymmetrical, and corner-notched. Pottery exhibits plain or cordmarked exterior surfaces. Pottery is predominately tempered with crushed granite and sherds. The lithic assemblage is characterized by small, flake tools with marginal retouch. Larger bifaces are uncommon. Finally, 23JA80 appears to have been a small, relatively clean site, i.e., lithic and pottery debris was not deposited in great quantities as is often the case in Late Archaic or Kansas City Hopewell sites.

The small size and relatively light density of debris suggest that 23JA80 was a short-term occupation. A number of procurement and maintenance tasks were conducted, as suggested by artifacts and features. These include tool manufacturing, hunting, butchering, hide-working, and food preparation.

Based on a small quantity of charred floral remains, a late summer or fall occupation is postulated. Furthermore, it is unlikely, due to river flooding, that the site would have been occupied during the spring or early summer months.

Table 3.12

Attributes of 23JA80 Ceramics

n=35

Attribute	Quantity	Percent
Exterior Surface Treatment:		
Plain	29	(82.9)
Cordmarked	6	(17.9)
Temper:		
Crushed Granite	16	(45.7)
Sherd and Crushed Granite	9	(25.7)
Sand	5	(14.3)
Sand and Crushed Granite	3	(8.6)
Sherd	2	(5.7)

Color:	Exterior	Interior	Core
Buff	26 (74.3)	12 (34.3)	6 (17.1)
Brown	6 (17.1)	11 (31.4)	18 (31.4)
Grey	3 (8.6)	12 (34.3)	11 (51.4)

Table 3.13

Floral Remains from 23JA80

Family	Genus	Common Name	Charred	Some Charred	Not Charred	?
Amaranthaceae	Amaranthus	Pigweed		110		55
Chenopodiaceae	Chenopodium	Goosefoot				3
Euphorbiaceae	Euphorbia	Spurge			1	5
Poaceae	Unknown	Grass Family	5			
Portulacaceae	Portulaca	Purslane				57

Eligibility for Nomination to the National Register

Test excavations at sites 23JA36, 23JA79, and 23JA80 have determined that they are eligible for nomination to the National Register. Sites 23JA32 and 23JA55 have been severely damaged by modern agricultural practices and construction activities, respectively.

Chapter 4

EXCAVATIONS AT 23JA40
by
Robert J. Ziegler

Introduction

Site 23JA40 is in the SE¼, SE¼, of Section 36, T48N, R31W, on the U.S.G.S. 7.5 Minute Independence Quadrangle. The site is situated on the second terrace of the Little Blue River. W.R. Wilson recorded 23JA40 in 1961 (Survey Sheet, Archaeological Survey of Missouri). Wilson collected large, corner-notched projectile points, side-notched points, dentate-stamped pottery, and cross-hatched, shell-tempered pottery. In 1973, Mike Heffner of the Museum of Anthropology, University of Kansas, surveyed 23JA40. Heffner (1974:13) also examined Mike Casey's (a local artifact collector) collection from 23JA40, noting the presence of grit-tempered plain or cordroughened pottery, and shell-tempered pottery. Based on artifacts recovered by Wilson and Casey, Heffner (1974:13) suggested that Middle Woodland, Late Woodland, and Middle Mississippian components were represented at 23JA40.

During July 5 to July 29, 1977, and June 15 to August 4, 1978, an eight and a seven person crew, respectively, conducted excavations at 23JA40. A total of 384 man-hours were required to excavate the site. When visited in 1977, the site was obscured by a dense cover of weeds. To increase surface visibility, two of the more promising areas of the site were plowed. The first area (hereafter referred to as 23JA40) covers about 12,000m^2 (Fig. 3.1). The second area (hereafter referred to as 23JA40 West) is about 400 m. southwest of the first, and covers 4,000m^2 (Fig. 6.1). Although time did not permit an investigation, information supplied by Casey suggests that there is a continuous scatter of artifacts between the two areas.

The results of investigations at each area are presented in separate sections below. Artifacts from the surface and test excavations at 23JA40 and 23JA40 West were classified according to the surface classification system described in Chapter 2 of this report. A majority of artifacts from test excavations were recovered from the plow zone. Having been disturbed by modern cultivation, it was decided that they were of minimal value for interpretative purposes, and could be classified according to a general scheme. On the other hand, artifacts recovered in 1978 from below plow zone excavations at 23JA40, were considered to be of greater importance, and classified according to the hierarchial-morphological and functional systems described in Chapter 2.

23JA40 West

Surface-Grab Sample

During the summer of 1977, a surface-grab sample was collected from 23JA40 West. The quantities of artifacts collected from the surface, as well as those recovered from test excavations and discussed below, are presented in Table 4.1. No ceramics and only one projectile point were recovered. The point (not shown) is a large, corner-notched type that is difficult to place in time, since similar specimens are known to occur from Late Archaic through Middle Woodland times.

Table 4.1

Artifacts Recovered from 23JA40 West

Artifact Class/Code	Surface	Test Excavations
Projectile Point (20)	1	1
Biface (40)	10	
Uniface (50)	66	12
Core (60)	8	
Chunk (65)	12	
Debitage (70)	591	108
Unworked Stone (90)	84	5
Limestone (100)	116	44
Hematite (110)	1	1
Burned Earth (130)	1	4
Unworked Bone (150)	10	
Modern (200)	16	

Test Excavations

During the summer of 1978, test excavations were conducted at 23JA40 West (Figs. 4.1a-b). A grand total of $10m^2$ (Fig. 4.2) was excavated in the following manner. The plow zone was removed in $1m^2$ units. Below the plow zone, excavation proceeded in $1m^2$ units and arbitrary 10 cm. levels, to a depth that exceeded cultural debris. In addition, a soil probe was inserted into the floor of each pit to test for the presence of cultural deposits below floor level. One test (test pit 2) was excavated to 1.12 m. below surface to make sure that there were no deeply-buried cultural deposits.

Artifacts recovered from test excavations at 23JA40 West are presented in Table 4.1. No features, faunal remains, or floral remains were encountered. Cultural materials, for the most part, were confined to the 35 cm. thick plow zone; only a few chert flakes were recovered below plow zone. As a consequence of the shallow nature of the deposits, 23JA40 West undoubtedly has been severely disturbed by modern cultivation.

Only one diagnostic artifact, a small triangular, basally and side-notched projectile point (Fig. 4.25d), was recovered from test excavations (test 2, plow zone) at 23JA40 West. Similar specimens have been recovered from the radiocarbon-dated Maybrook component at the Seven Acres site (Chapter 10, this volume). The Seven Acres site is located due south of 23JA40 West, just across the Little Blue River. It is quite possible that the specimen from 23JA40 West was lost by a prehistoric hunter from the Seven Acres site.

And finally, chert utilization at 23JA40 West follows the pattern set by other sites in the immediate area. The locally-available Winterset chert accounts for 90% of the total (surface and subsurface combined). Argentine, Burlington, and Westerville cherts are also present.

23JA40

Introduction

Several different archaeological procedures were conducted at 23JA40 during the summers of 1977 and 1978 (Figs. 4.3-4.5). Work accomplished in 1977 included a gridded surface collection and test excavations. A total of $64m^2$ was excavated. In 1978, power equipment was utilized to remove the plow zone from approximately one-half of 23JA40. Below the plow zone, a grand total of $80m^2$ was excavated by hand, including a large, block excavation and three smaller ones around possible features.

Gridded Surface Collection

When visited in 1977, 23JA40 was obscured by a dense cover of weeds. To increase surface visibility, the area was plowed to a depth of 25 cm. After plowing and subsequent rains, a gridded surface collection was conducted. A grid was superimposed over the entire plowed area ($12{,}000m^2$), and then all items were collected and bagged according to 10m. grid squares. An inventory of items collected from the surface, as well as those recovered from test excavations and discussed below, are presented in Table 4.2.

The distributions of selected groups of artifacts are shown in Figs. 4.6-4.8. Cultural material was concentrated in a $4{,}800m^2$ area (540-620 east and 480-540 north). Excavations in 1977 and 1978 were conducted within this area. Overall, excavations showed that there was a poor correspondence between surface and subsurface concentrations of artifacts. This statement is particularly relevant with regard to limestone

Figure 4.1 a. View of 23JA40 West, looking east.
b. Test excavation at 23JA40 West.

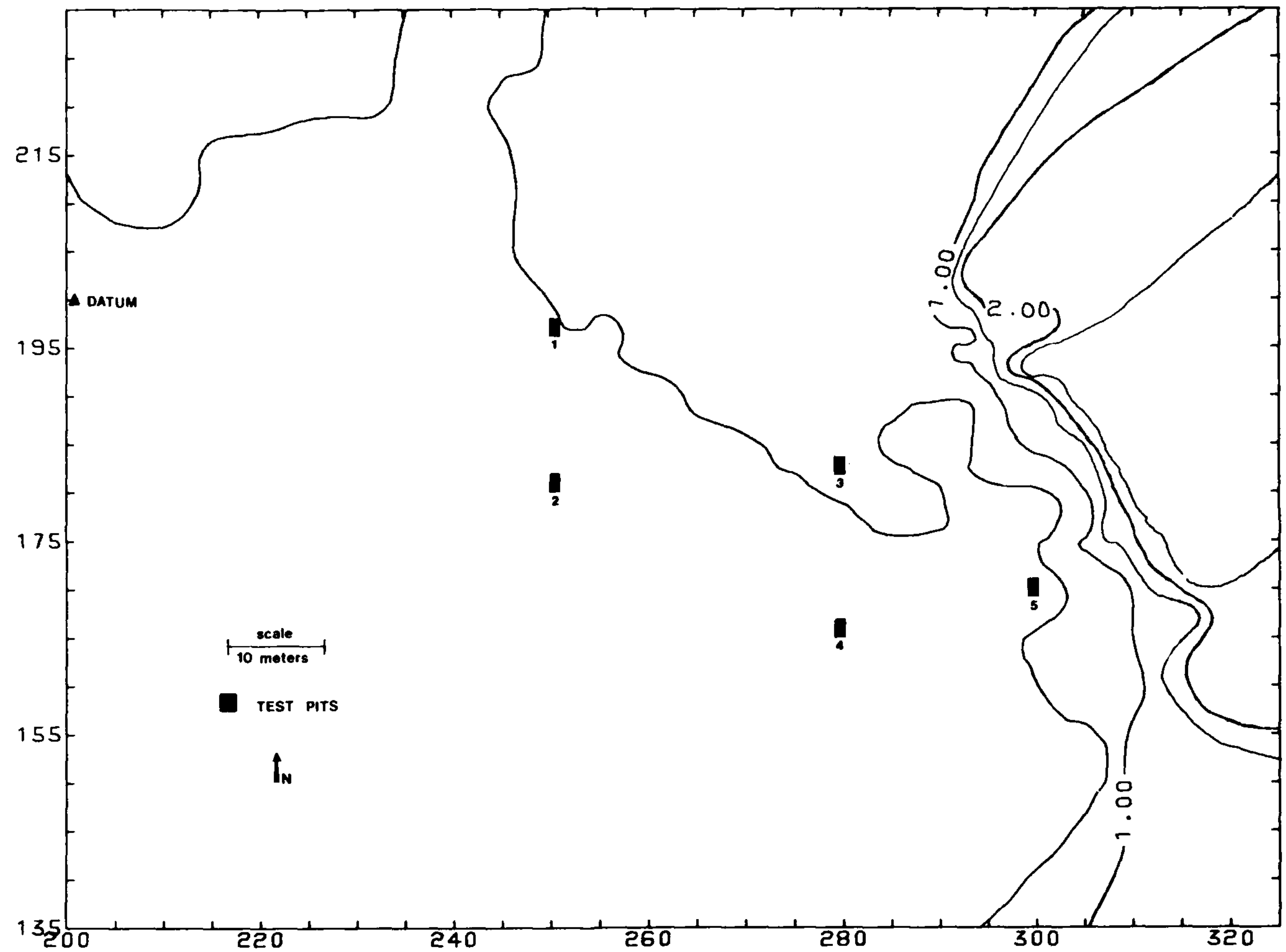


Figure 4.2 Contour map of 23JA40 West, showing the placement of datum point and test excavations. Contour lines are measured in .5 m. below datum elevation.

Figure 4.3 a. View, looking south, of weed-covered 23JA40.
b. Tests pits at 23JA40.

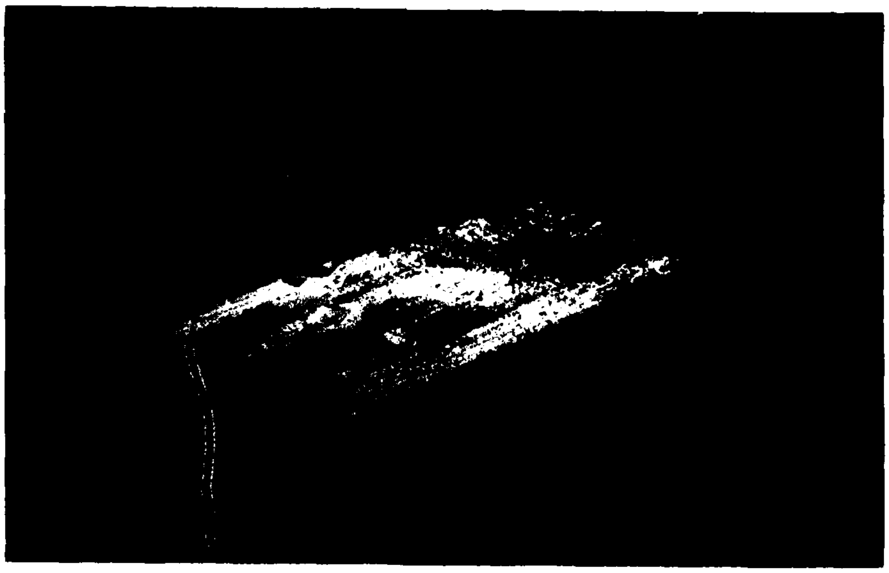


Figure 4.4 a. Paddlewheel scraper that was used to remove the plow zone at 23JA40.

b. Aerial view of 23JA40. The area where the plow zone was removed, as well as the 1978 excavations, are visible in the center of the photograph.

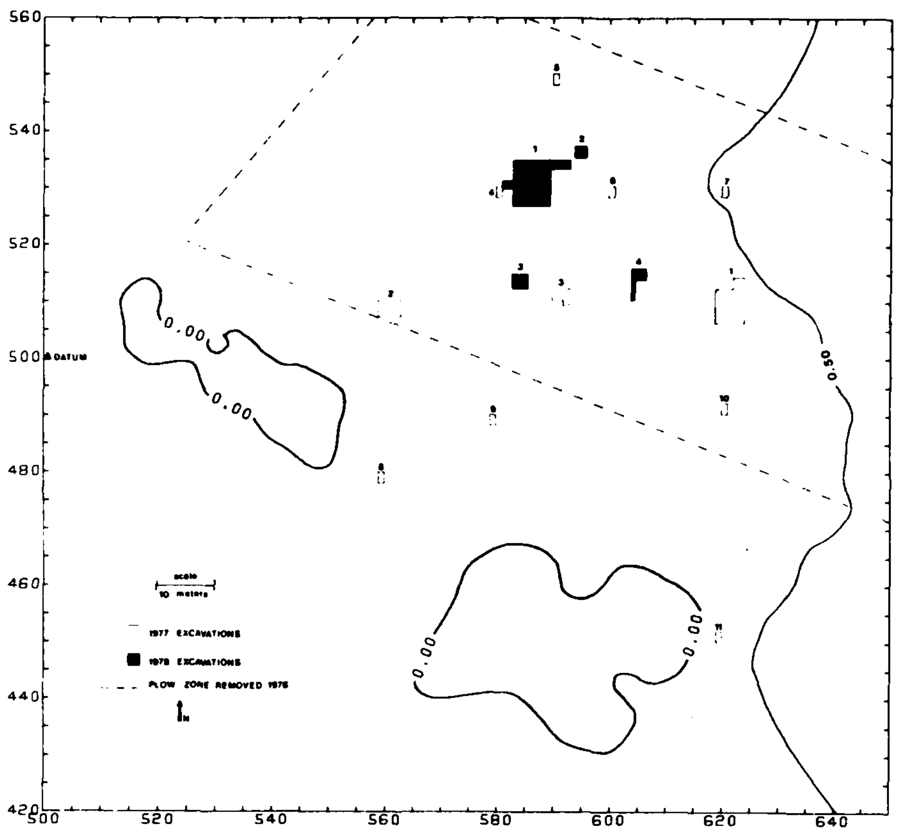


Figure 4.5 Contour map of 23JA40, showing the locations of the 1977 and 1978 excavations. Contour intervals are measured in .5 m. below datum elevation.

Table 4.2

Artifacts Recovered from 23JA40 in 1977

Artifact Class/Code	Surface	Test Excavations
Pottery Sherd (10)	9	6
Projectile Point (20)	14	20
Biface (40)	44	4
Uniface (50)	167	22
Core (60)	33	2
Chunk (65)	142	11
Debitage (70)	1,903	1,903
Worked Stone (80)	8	
Unworked Stone (90)	447	515
Limestone (100)	838	51
Hematite (110)	1	15
Limonite (120)		4
Burned Earth (130)	10	1,032
Unworked Bone (150)	11	188
Modern (200)	47	59

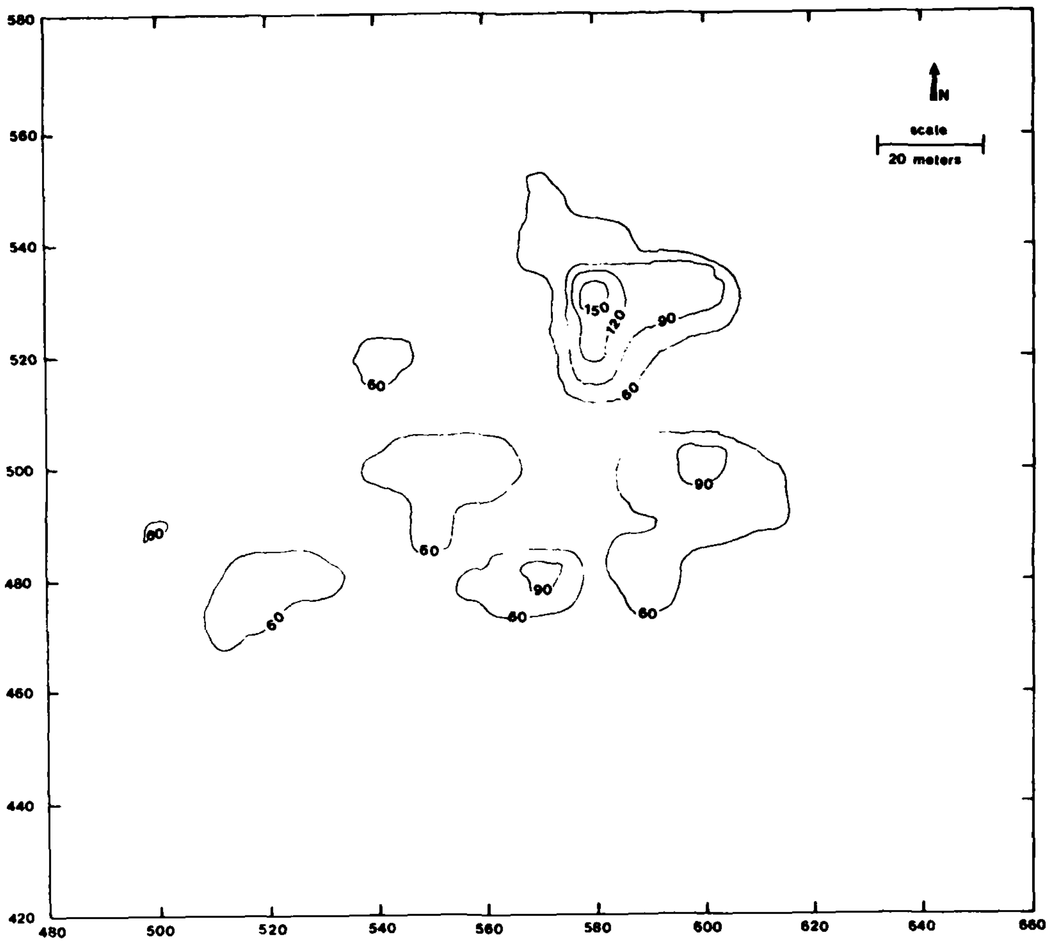


Figure 4.6 Density map of chipped-stone debris, according to frequency, on the surface of 23JA40. Density lines represent intervals of 30 pieces of debris.

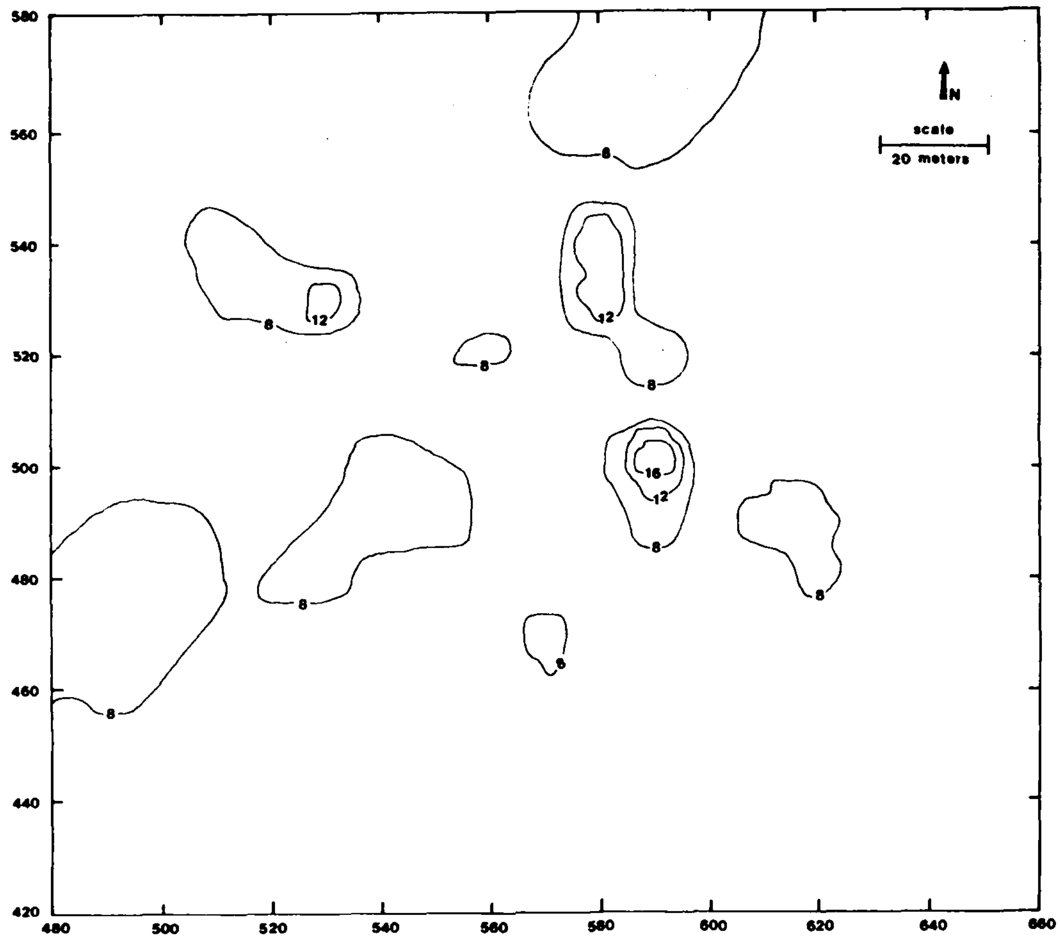


Figure 4.7 Density map of lithic tools, according to frequency, on the surface of 23JA40. Density lines represent intervals of 4 tools.

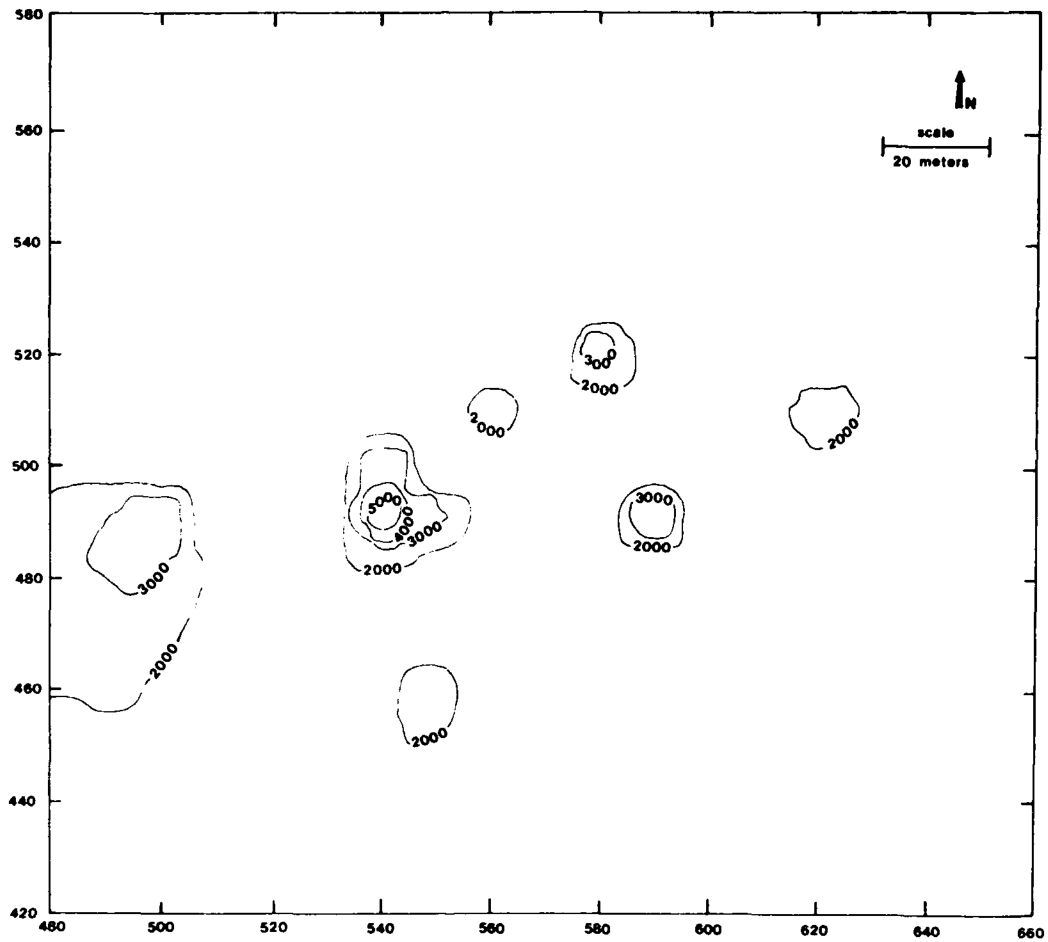


Figure 4.8 Density map of limestone according to weight, on the surface of 23JA40. Density lines represent intervals of 1000 grams.

or tools. Tests placed in or near surface concentrations of either of these two groups were generally unproductive. Chipping debris, however, showed a slightly better correspondence. For example, a dense surface concentration of chipping debris at 585 east and 530 north indicated a lithic manufacturing area excavated in 1978 (fig. 4.5, area 1).

Projectile points from the surface of 23JA40 indicate the presence of several components. Large, corner-notched, and contracting stem points (Fig. 4.27a-f) suggest Archaic and Early or Middle Woodland occupations. Smaller, notched and unnotched projectile points (Fig. 4.26e-h) represent Late Woodland or later complexes.

Ceramics from the surface of 23JA40 have plain or cordmarked exterior surfaces and grit tempering.

Test Excavations

A grand total of $64m^2$ (Fig. 4.5) was excavated in the following manner. The plow zone was removed in $1m^2$ units and sifted through ¼ inch mesh screens. Beneath the plow zone, excavation proceeded in $50cm^2$ units and arbitrary 5 cm. levels; because of an extremely high clay content, these soils could not be screened. Tools were plotted in three dimensions to the nearest centimeter. All fill from possible features was saved for flotation. And finally, a soil probe was inserted into the floor of each test pit to determine if cultural deposits were present below floor level.

Two soil zones were recognized: 1. a 10YR3/2 (very dark greyish brown) silty clay loam plow zone extended 35 cm. in depth; and 2. a 10YR313 (dark brown) silty clay below the plow zone. Cultural material was most heavily concentrated in the plow zone, with lesser amounts extending about 10-15 cm. below plow zone. No deeply-buried cultural debris was discovered. Two tests (Fig. 4.5, tests 6 and 8) were excavated to a depth of 1m. below the present surface of the ground; no cultural debris was recovered below a depth of 40cm.

Although test pits 1 and 2 were expanded beyond an initial 1 x 2 m. size because of possible prehistoric features, subsequent investigations showed both to be of modern origin. An area which apparently had been subjected to intense burning was encountered in test 1. It was a large amorphous stain, measuring about 1.25 x 1.60 m., and consisting of large quantities of burned earth and charcoal (Fig. 4.9a). Several lumps of burned earth were larger than 10 cm. in diameter. Charcoal consisted of lumps and linear pieces. Debris extended from the plow zone to a depth of 60 cm. below surface. As the excavation proceeded, it became apparent that the feature may have been of modern origin. It did not conform to any known prehistoric feature type. In addition, very little cultural debris was found within or peripheral to the burned area. To add further support to this interpretation, two charcoal samples were submitted for radiocarbon determinations. One is A.D. 1805±55 (UGa-1871) and the other is modern (UGa-1872).

Another area, similar to the one just described, was encountered in test pit 2. It measured 1.50 x 1.00 m., and consisted of burned earth and charcoal. Some of the lumps of burned earth were large (Fig. 4.9b). The possible feature extended to 45 cm. below surface. A radiocarbon determination on charcoal indicates a modern origin (UGa-1870). It is suggested that these two burned areas, and probably a number of undiscovered others, resulted from the clearing of the land for agricultural use. Such burned areas may have formed when tree stumps, and to some degree tree roots, were burned by farmers.

Figure 4.9 a. Excavation of burned area 1.
b. Excavation of burned area 2.

A complete inventory of items recovered from test excavations is presented in Table 4.2. Only eight of these artifacts are diagnostic. The base of a large, corner-notched projectile point (Fig. 4.27g) was recovered from test 3 at a depth of 33 cm. below surface. Similar specimens occur from Late Archaic through Middle Woodland times. A smaller, serrated edge projectile point (Fig. 4.25a) was recovered from test 10 at a depth of 35 cm. below surface. It probably dates to Late Woodland times or later. Ceramics have plain exterior surfaces and grit tempering. All were recovered from the plow zone. Plain-surfaced grit-tempered pottery is characteristic of later Kansas City Hopewell and Late Woodland times (Chapter 1, this volume).

Results of 1977 Investigations

Work conducted in 1977 enabled the following statements to be formulated:

1. Artifacts representing several components were present on the surface and in the plow zone at 23JA40. Cultural affiliations ranged from Late Archaic to post Late Woodland.

2. Cultural deposits were present below the plow zone. However, since no diagnostic artifacts were recovered, the cultural affiliation of these materials was unknown.

3. Preparation of the area for agricultural use and subsequent repeated plowing have disturbed the prehistoric cultural deposits, most particularly those in the plow zone.

Based on the above findings, field work in 1978 was aimed at locating undisturbed deposits below the plow zone. To accomplish this goal, power equipment was utilized.

Plow Zone Removal

In June of 1978, the plow zone was removed from approximately one-half (6000 m^2) of 23JA40. The decision to concentrate efforts in this portion of the site was based on test excavations and generally higher phosphate levels (Figs. 7.8 and 7.9). Removal of the plow zone resulted in the discovery of a dense concentration of lithic debris and several features. Only one modern disturbance was noted. This was a burned area similar to the two described above. Fortunately, it was not near any of the features, rather centered at approximately 570 east and 560 north.

Excavations

Excavations included a large block excavation and three smaller areas around possible features (Figs. 4.10 and 4.11a). The block excavation was placed in an area where a dense concentration of lithic materials was uncovered by plow zone removal. Initial hand excavation in this area showed that cultural deposits extended only about 10 cm. below the bottom of the plow zone, i.e., a depth of 45 cm. below surface. It was decided that the size of the excavation unit would be a 50 cm. square, 10 cm. in depth. All tools were plotted in three dimensions to the nearest centimeter.

Each feature, within and outside of the main block excavation, was removed as a unit. The fill from each was saved for flotation.

Features

Feature 1, a dense concentration of lithic debris and tools, was centered at 585.00 east and 528.35 north (feature 1, as well as features 2, 3, 7, and 8 are within the main block excavation). Lithic materials

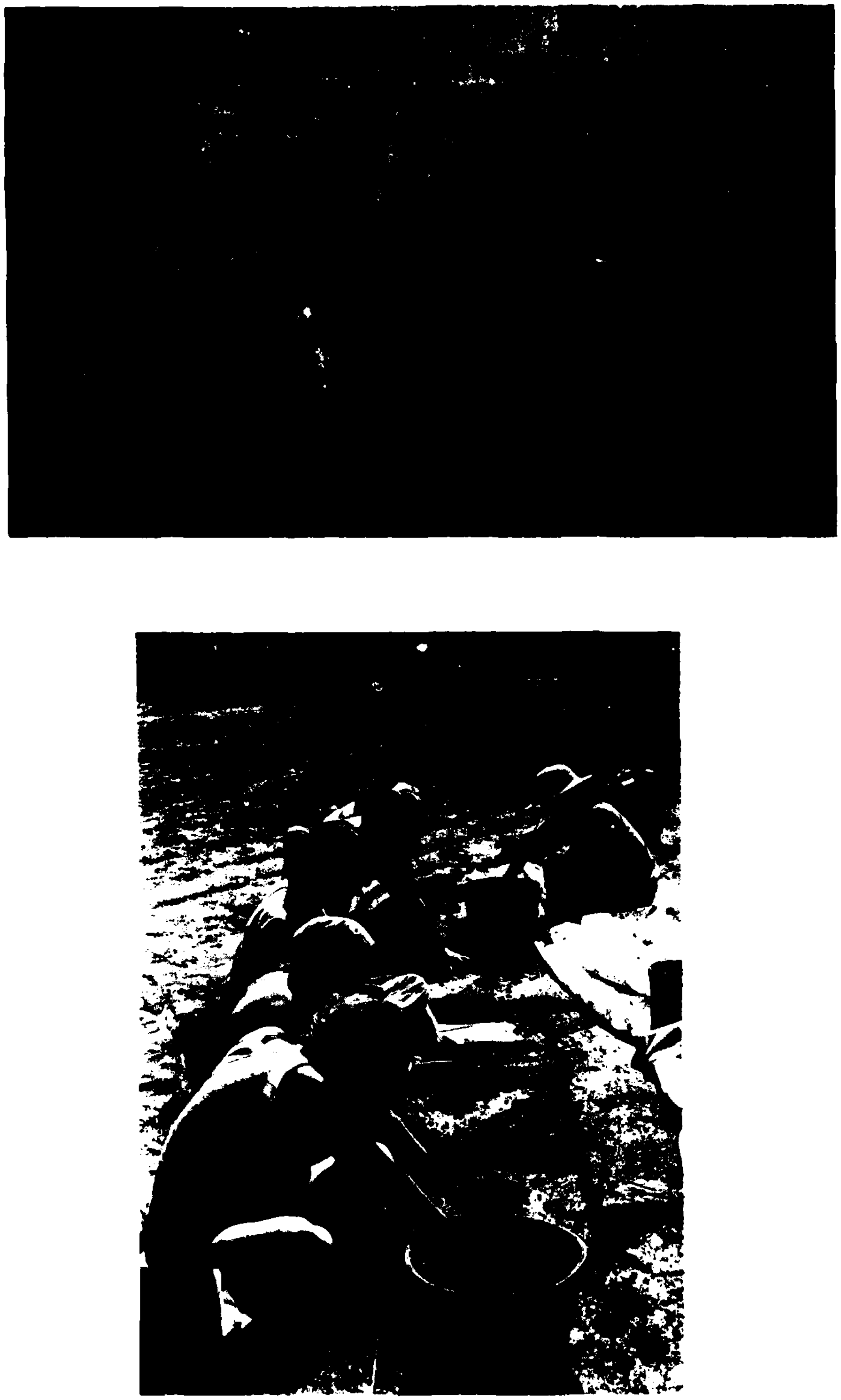


Figure 4.10 a. Aerial view of 23JA40, showing the stripped area and excavations.
b. Area 1, block excavation.

Figure 4.11 a. Completed block excavation.
b. Feature 1.

in feature 1 were highly clustered (Fig. 4.11b). One large projectile point (Fig. 4.28c) was among the artifacts recovered from the feature. Based on the dominance of chipping debris, and tools in the early stages of manufacture, feature 1 is interpreted to have been a lithic manufacturing area.

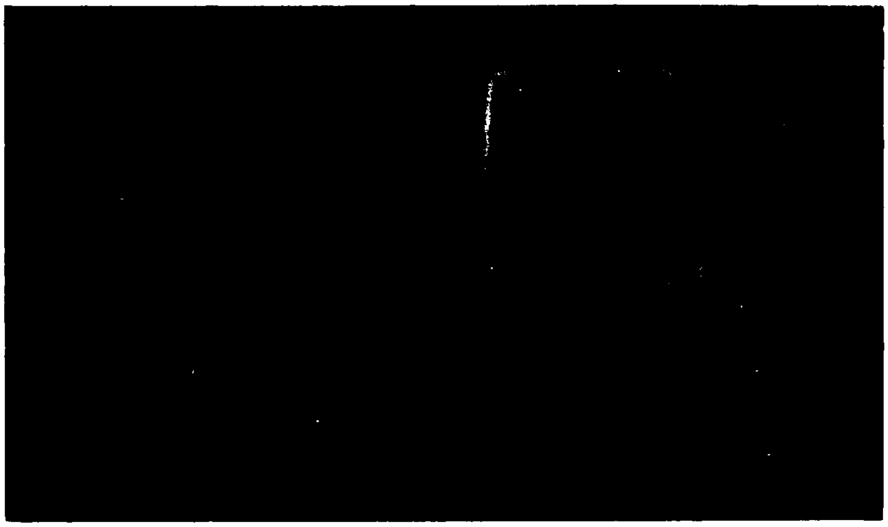
Feature 2 was centered at 587.35 east and 527.00 north. The feature had no distinct outline. It consisted of several splotches of charcoal, a very small amount of burned earth, and two burned pieces of charcoal, concentrated in an area measuring 50 x 25 cm. (Fig. 4.12a). The depth of the feature was about three cm. A radiocarbon determination on charcoal from feature 2 is A.D. 100±140 (UGa-2350). Feature 2 may have been an open hearth from which the contents were washed away by flooding, or removed by the prehistoric inhabitants for other uses. Alternatively, feature 2 could represent debris cleaned out of a nearby hearth. This interpretation is more likely, since there is no convincing evidence of in situ burning.

Feature 3 was centered at 581.40 east and 530.25 north. It consisted of a concentration of small burned chunks of limestone, and small amounts of ash, charcoal, burned earth, and animal bone (Figs. 4.12b and 4.13a). Since the feature exhibited no distinct outline, its limits had to be defined by the presence of limestone or other cultural debris. The feature measured 74 x 31 cm., and five cm. in depth. The total weight of the limestone was 1850 grams. The unusual shape, lack of depth, and badly-burned pieces of limestone, all suggest that feature 3 was hearth cleaning debris.

Feature 4 was centered at 583.60 east and 513.35 north (Fig. 4.5, area 3). The feature primarily consisted of a concentration of limestone and sandstone (Figs. 4.13b and 4.14). Charcoal, hematite, and burned earth were also present in small quantities. There was no distinct stain present, so the outline of the feature had to be defined on the presence of cultural debris and the loose texture of the surrounding soil. The feature measured 80 x 100 cm. and 15 cm. in depth. The total weight of limestone and sandstone was 8,162 grams. Areas peripheral to the feature were excavated in the hope that cultural debris would be encountered. Only a few waste flakes and a single finished tool, a broken biface, were recovered. Feature 4 is considered to have been some sort of basin-shaped hearth.

Feature 5 was centered at 602.60 east and 510.13 north (Fig. 4.5, area 4). The feature primarily consisted of a concentration of fire-reddened limestone (Fig. 4.15a). Other cultural materials present in much smaller quantities included charcoal, burned earth, chert flakes, burned bone fragments, and baked clay. The feature measured 53 x 100 cm., and a maximum of eight cm. in depth (Fig. 4.15b). Feature 5 can be compared to feature 3. Both had an unusual shape which lacked depth. Burned limestone occurred in about the same amount in each; feature 3 had 1,850 grams, while feature 5 had 1,702 grams. Based on all available evidence, it is suggested that feature 5 was also hearth cleaning debris.

Feature 6 was centered at 605.50 east and 513.37 north (Fig. 4.5, area 4). The feature primarily consisted of a concentration of limestone, burned earth, and charcoal (Fig. 4.16a). Other cultural debris, present in far less quantities, included burned bone fragments, hematite, chert, and two baked clay balls. The feature measured 95 x 100 cm., and a maximum of 31 cm. in depth. Limestone, totaling 2,508 grams, was concentrated in the upper one-third, while burned earth and charcoal were scattered throughout the soft loose fill of the feature (4.16b). The



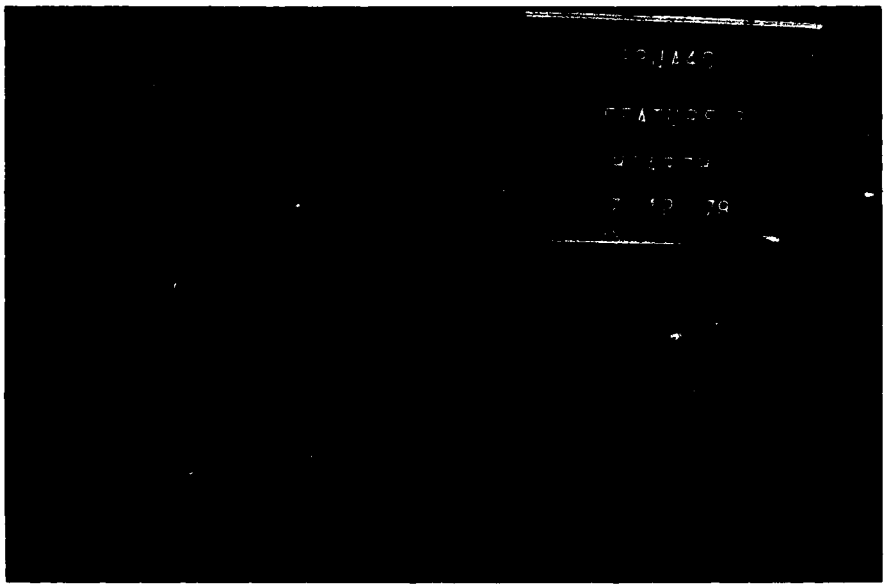


Figure 4.12 a. Feature 2.
b. Feature 3 before the contents were removed.

Figure 4.13 a. Feature 3, after the contents were removed.
b. Feature 4, before excavation.

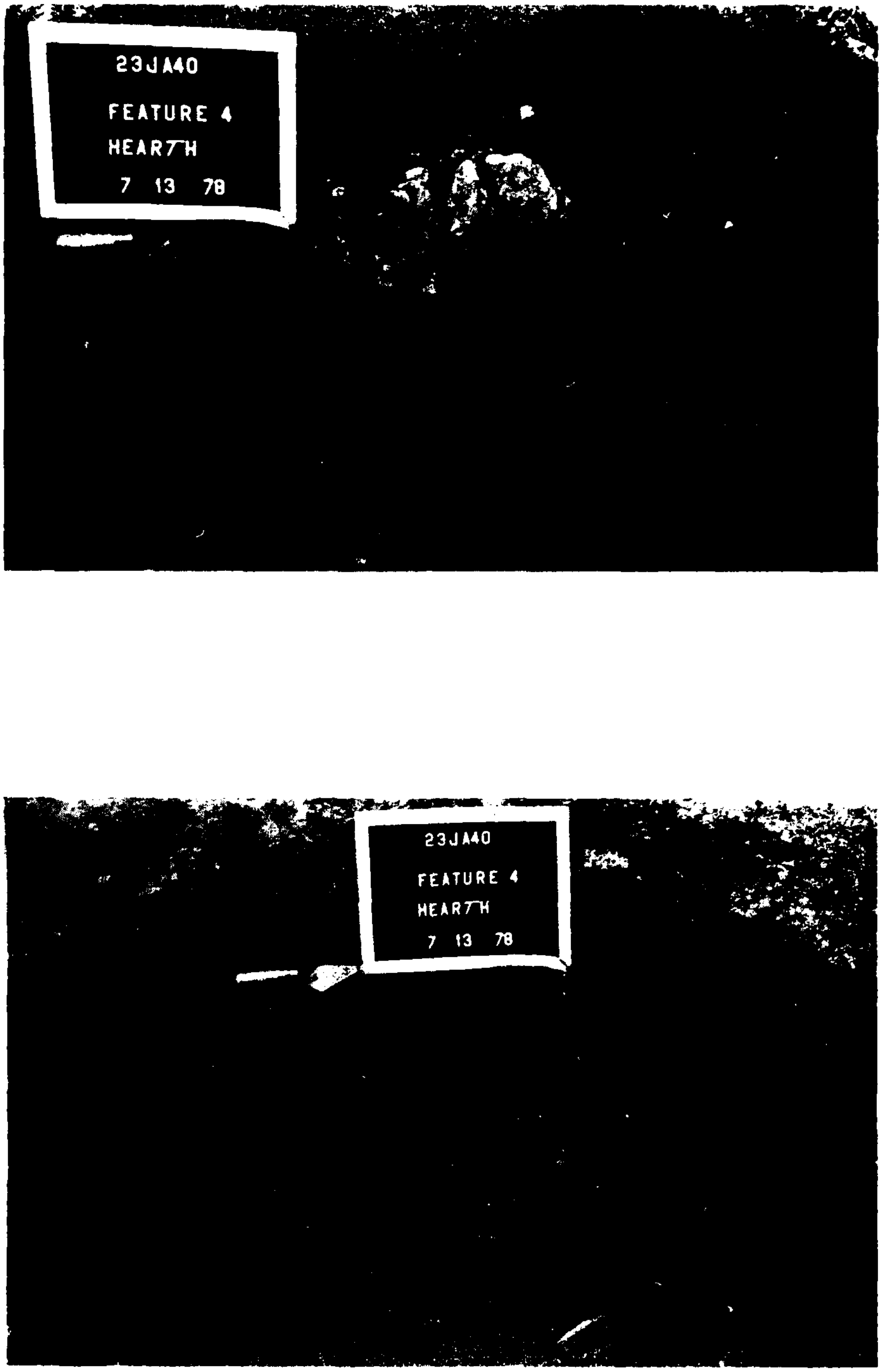
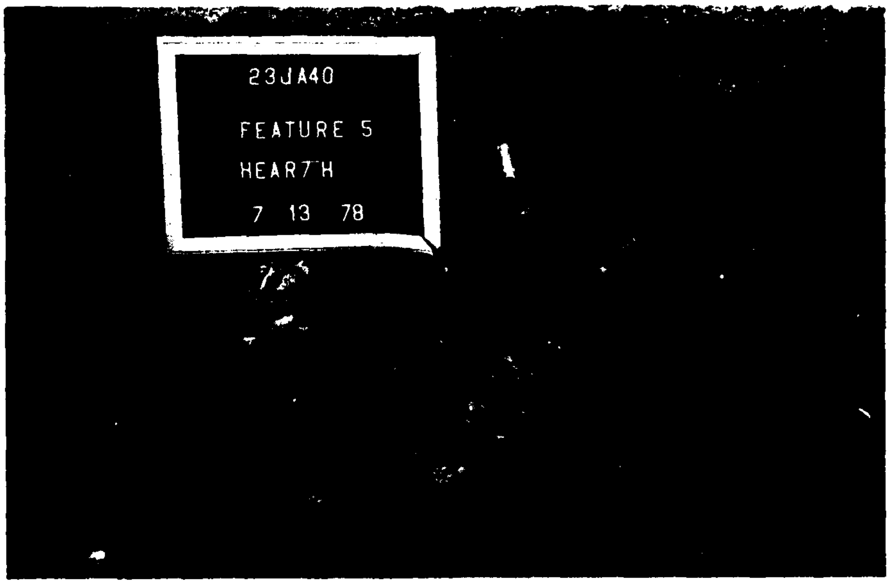


Figure 4.14 a. Feature 4 profile.
b. Feature 4, after the contents were removed.



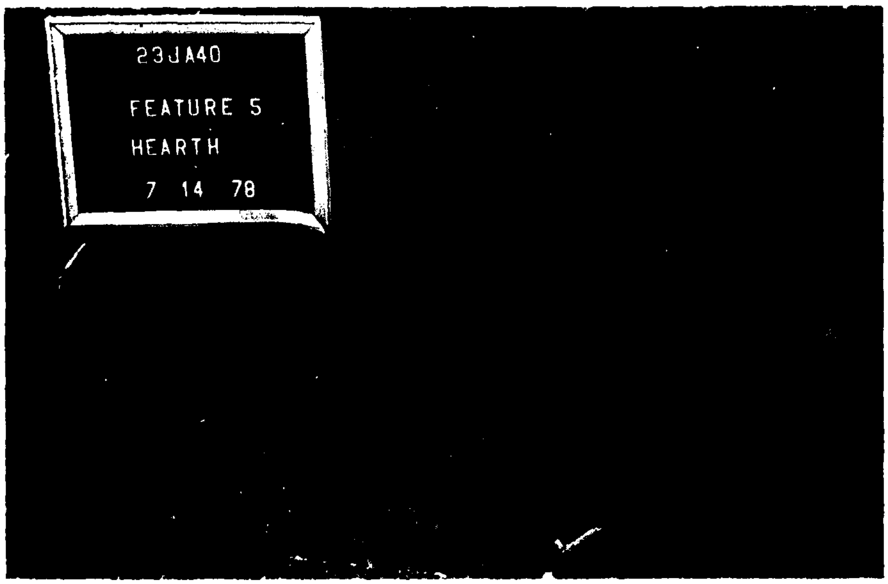


Figure 4.15 a. Feature 5, before excavation.
b. Feature 5, after excavation.

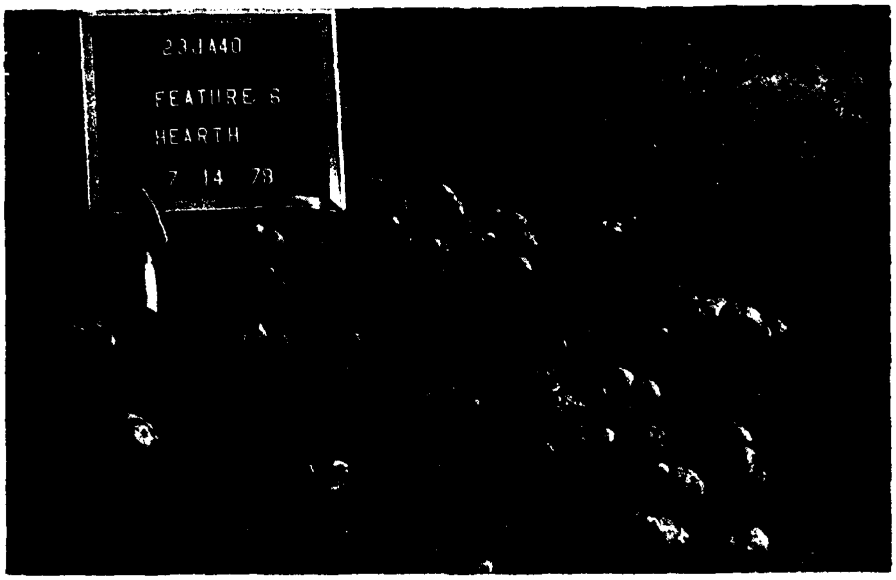


Figure 4.16 a. Feature 6.
b. Feature 6 profile.

contents and the structure (particularly the depth) of feature 6 suggest that it was a hearth or earth oven. Charcoal, primarily from two concentrations near the bottom of feature 6, yielded a date of 350±100 B.C. (UGa-2351). Excavation of areas peripheral to feature 6 turned up only a few cultural materials; most important of these is a fragment of a large, corner-notched projectile point (Fig. 4.27h).

Feature 7, a broken sandstone metate, was centered at 591.75 east and 534.00 north. When first encountered, it appeared as a number of pieces of broken sandstone (Fig. 4.17b). Although all of the pieces were not present, a reconstruction was possible (Fig. 4.24a). On one side the metate is ground down to a smooth surface. Portions of the other side are also ground. Excavation of areas immediately adjacent to the metate unearthed only a few waste flakes.

Feature 8 was centered at 588.76 east and 533.88 north. It consisted of a very small concentration of lithic materials, measuring 15 x 13 cm. (Fig. 4.18a). These included one unfinished biface, one core, and 20 flakes and pieces of shatter. The overall density of lithic debris in the immediate vicinity of feature 8 was heavy, but not nearly as concentrated (Fig. 4.18b).

Finally, a concentration of limestone was uncovered by stripping operations. Initially it was thought that it might be a portion of a hearth. However, excavation of the area (Fig. 4.5, area 2) surrounding the concentration showed that it was simply an unburned slab of limestone which measured 60 x 75 cm. The only cultural materials in the immediate vicinity of the slab were a few waste flakes and two retouched flakes. The function of the limestone slab is unknown.

Morphological Classification of Chipped Stone

A morphological classification of the 9,040 pieces of chipped stone recovered in 1978 is presented in Fig. 4.19. Only 129 specimens exhibit modification or wear, indicating that the vast majority of chipped stone represents by-products of tool manufacturing. Blank types most frequently selected for further modification include flakes and tabular pieces, respectively.

The locally-available Winterset chert accounts for more than 95% of the total. Argentine, Burlington, and Westerville cherts are present in small quantities.

Functional Classifcation Of Chipped Stone

The following is a description of modified chipped-stone tools from 23JA40. A breakdown of tool forms and blank types is presented in Table 4.3. Types and placement of wear on complete and incomplete tools are presented in Tables 4.4 and 4.5.

Tool Class: Marginally Modified

Modified chips (110): Most of the modified chips, which are both thin and thick, lack discernible wear. Some of these may represent flakes which broke during the edge modification process.

Modified Flakes (310): The modified flakes tend to be thick (greater than 12mm) and have wear characteristic of scraping medium hard to hard materials. Most of these flakes were probably used to scrape dry wood or bone.

Modified Shatter (210): These thick tools with crushing were probably used in scraping medium hard and hard materials.

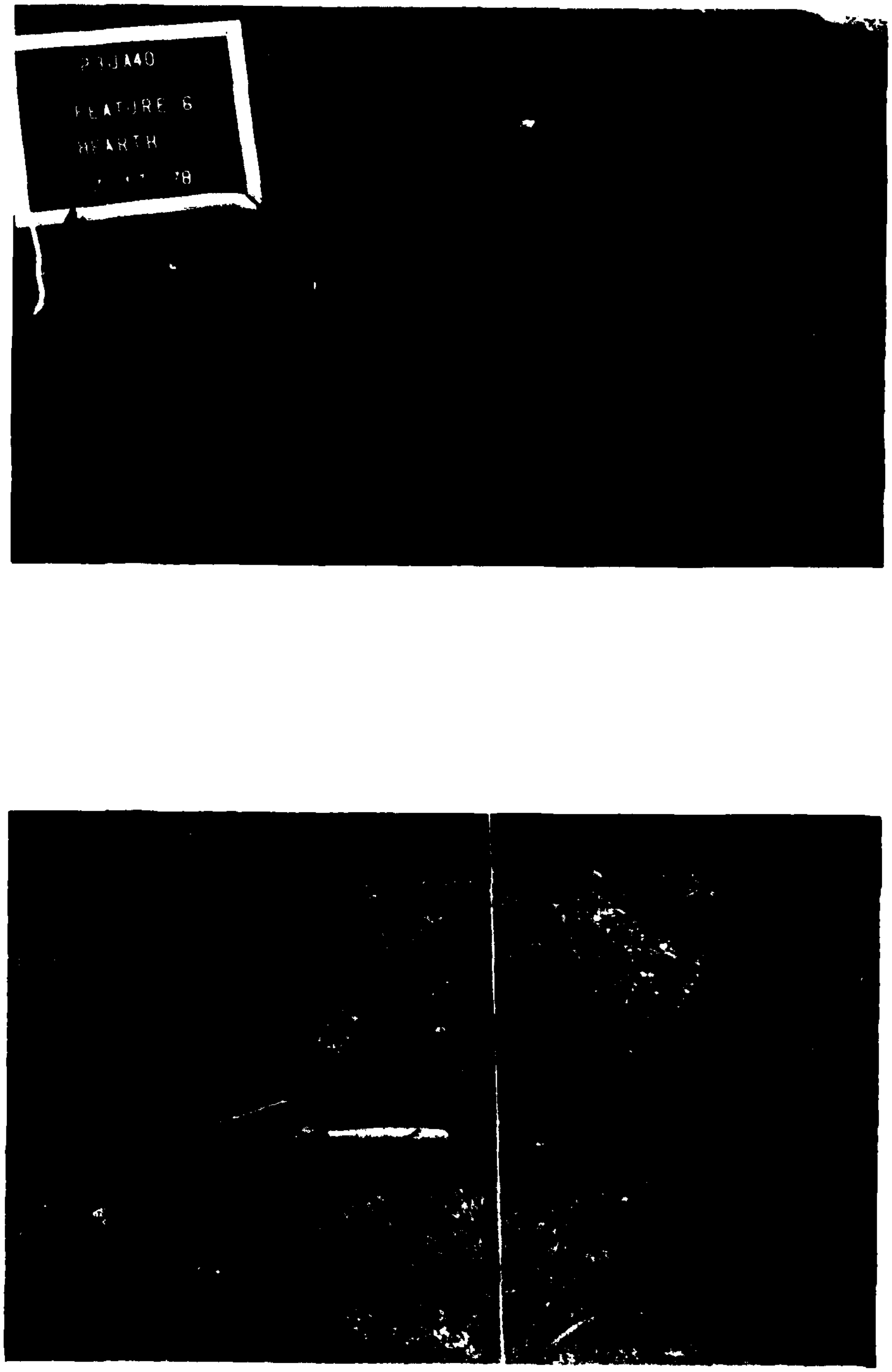


Figure 4.17 a. Feature 6, after contents were removed.
b. Feature 7, a broken sandstone metate.

Figure 4.18 a. Feature 8.
b. Feature 8 and nearby cultural debris.

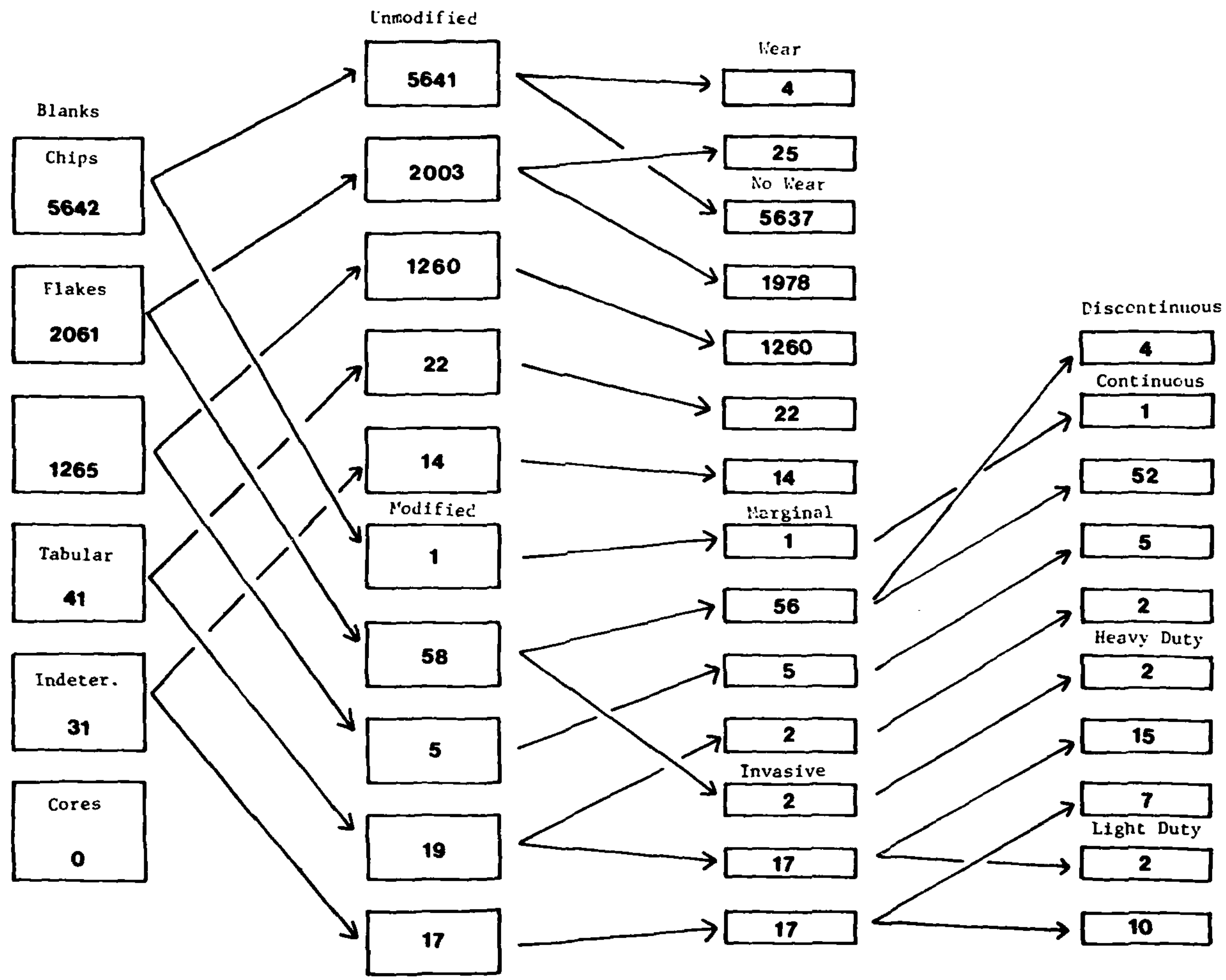


Figure 4.19 Morphological classification of chipped stone recovered from 23JA40 in 1978.

Table 4.3

Frequencies of Marginally Modified Tools

Discontinuous Retouch		Continuous Retouch	
Tool Code	Quantity	Tool Code	Quantity
310	2	110	1 chip
610	1 flake	210	5 shatter
700	1 flake	310	7 flakes
		500	1 flake, 1 tabloid
		610	3 flake, 1 tabloid
		700	5 flakes
		710	4 flakes
		950	3 flakes

Frequencies of Invasively Modified Tools

Light		Heavy	
Tool Code	Quantity	Tool Code	Quantity
860	4 indeterminate	900	6 indeterminate, 1 flake
	2 tabloids		5 tabloids
870	4 indeterminate	910	1 indeterminate, 1 flake
880	2 indeterminate		10 tabloids

Table 4.4

Complete Tools from 23JA40

		Lateral			Disto-Lateral				Distal			
	Tool Code	C S,MH	C MH,H	S MH,H	NW	C S,MH	C MH,H	S S,MH	C S,MH	C MH,H	S SS	S MH,H
Invasive	860				2L							
	870					1L	1L					
	880		1L							1L		
	910		2H		3H					4H		
Marginal	320			2H	3H, 1L			1H				1H
	700	1H									1H	
	710				1H							1H
	950				1H				1H			

Key: NW--no wear
C--cutting
S--scrapping
SS--soft materials
S,MH--soft and medium hard materials
MH,H--medium hard and hard materials
L--light duty tools (less than 12 mm in thickness) (this includes micro tools)
H--heavy duty tools (greater than 12 mm in thickness)

Table 4.5

Incomplete Tools from 23JA40

		Tips		Midfragments				Bases		Indeterminate			
	Tool Code	NW	C MH,H	NW	C MH,H	S SS	S MH,H	NW	S MH,H	NW	C SS	S S,MH	S MH,H
Invasive	860	1L	1L	1L						1L			
	870		1L										
	900	4H	1H	2H	3H					2H			
	910		1H					1H					
Marginal	110							1H		1H,4L	1H		
	210									1H			3H,1L
	320	3H,4L		3H,4L			3H,3L	5H,3L	2H,1L				
	500									1H			
	610			1H			1H			2H		1L	
	700					1H	3H						
	710							1L	1L				
	950						1H						

End Scrapers (500): These two scrapers were probably unused and represent scraper preforms.

Gravers (610): Three of these heavy duty tools, which lack wear, are probably unfinished tools or freshly rejuvenated tools. The other gravers with crushing and rounding were used in scraping hard and medium hard materials.

Notches (700): Three notches probably represent the working of soft and medium hard materials. The concaved working edge characteristic of notches is suitable for manufacturing shafts or other round shaped objects. The notch associated with cutting was likely used in two directions (pulling and pushing) resulting in dorsal and ventral wear. Three of these heavy duty tools were probably used in scraping hard materials. These were used in only one direction.

Denticulates (710): Two light duty and two heavy duty denticulates were recovered. Two have no discernible wear, representing unfinished tools or tools only used for a short duration. Two have crushing on one edge face suggesting their probable use in scraping medium hard and hard materials. These tools were used in only one direction and may be associated with shredding activities.

Composite Tools (950): One complete tool, a combination graver-retouched flake, was used to scrape medium hard and hard materials.

Tool Class: Invasively Modified

Light Duty Preforms and Knives (860): These are apparently unfinished tools.

Light Duty Specialized Tools (870): These specimens were probably used as knives to cut medium hard and hard materials.

Light Duty, Notched Projectile Points (880): One tool with lateral crushing probably represents a hafted knife used to cut medium hard and hard materials. A second tool with distal crushing may be a dart or spear point which has hit or penetrated medium or hard materials.

Heavy Duty Preforms (900): These heavy duty tools are probably not finished tools. Since these are tool fragments they probably represent breakage during manufacture.

Heavy Duty, Unspecialized Tools (910): Three of these tools, which lack discernible wear, probably represent unfinished tools. Six tools exhibiting crushing on the lateral or distal edges were probably used in cutting medium hard and hard materials.

Summary of Site 23JA40:

The chipped stone tools recovered from site 23JA40 represent two primary activities: 1. production of a heavy and light duty tool inventory and 2. the cutting and scraping of medium hard and hard materials. A small, probably temporary, hunting and gathering campsite is indicated. The scarcity of projectile points suggests their curation while the absence of tools for working soft materials suggests hide preparation was not one of the activities performed at the site.

Cultural Affiliation

Based on radiocarbon dates and diagnostic artifacts, below plow zone cultural materials at 23JA40 are atrributed to the Early Woodland period (500 B.C.-A.D. 1). The radiocarbon date of 350±100 B.C. (UGa-2351) from feature 6 clearly dates this feature to the middle-to-early portion of the Early Woodland period. Two baked clay balls recovered from feature 6 are similar to specimens from Late Archaic and Early Woodland sites in

the Mississippi River Valley (Webb 1968). A fragment of a large, corner-notched projectile point (Fig. 4.27h), found near feature 6, is similar to specimens known to occur from Late Archaic through Middle Woodland times.

The radiocarbon date of A.D. 100 ± 140 (UGa-2350) on charcoal from feature 2 suggests either a Kansas City Hopewell (A.D. 1-500) or an Early Woodland (500 B.C.-1 A.D.) occupation. That is, given the size of the standard deviation, an Early Woodland occupation is just as probable as Kansas City Hopewell.

Indeed, diagnostic artifacts from the block excavation are more characteristic of Early Woodland than Kansas City Hopewell. A large projectile point (Fig. 4.28c) was recovered from feature 1 (Fig. 4.20). The haft element is broken off; shoulders indicate that the projectile was notched. This point is similar to large, notched, sub-triangular projectle points from the Traff site (23JA159), located about 7.5 kilometers southeast of 23JA40. The Traff site yielded dates of 395±70 B.C. (UG-2535) and 505±80 B.C. (UG-2404) (Christopher Wright, director of excavations, personal communication). Another specimen is a large, knife/projectile point (Fig. 4.25g) recovered at about 586 east and 532 north. Such artifacts are known to occur in Late Archaic and Early Woodland contexts. A third artifact, the base of a projectile point was recovered at approximately 584 east and 534 north. It is nearly identical to the base illustrated in Fig. 4.27g. Such artifacts are difficult to place in time, since they are known to occur from Late Archaic through Middle Woodland times.

The total absence of pottery at 23JA40 is somewhat problematical, since several sherds were recovered from the Traff site. Perhaps the absence of pottery at 23JA40 reflects site function, as the absence of pottery at a small, temporary, hunting and gathering campsite is not an unusual occurrence.

Spatial Distribution of Artifacts

The spatial distributions of tools, debitage, and limestone are presented in Figs. 4.20-4.22 (limestone from features is not included in Fig. 4.22). Tools clustered within and adjacent to feature 1, and just south and east of feature 8. Both of these areas also contained moderate-to-high densities of debitage. Limestone, on the other hand, generally occurred in areas which had moderate-to-low amounts of both lithic debris and tools. There was only one area where limestone clustered. Large and small chunks of limestone were scattered throughout the general area of 586-587 east and 530-531 north. Some pieces appeared to have been burned, thus it is quite possible that a hearth was present in the area at one time.

Discrete clusters of debitage and unfinished tools within feature 1 suggest that tool manufacturing was the primary activity. Other maintenance activities may have occurred within feature 1, as evidenced by a number of artifacts exhibiting traces of wear.

A high density of debitage and unfinished tools in the vicinity of feature 8 suggests that tool manufacturing was the primary activity. Tools with traces of wear suggest that other activities also occurred.

The lack of artifacts in close proximity to recognized features (hearths 2-6, and also feature 7, the metate) suggests that little or no activity occurred in those areas. However, it is quite probable that worn-out or broken artifacts would have been picked-up or swept-up from those areas and disposed of in already accumulating piles of debitage.

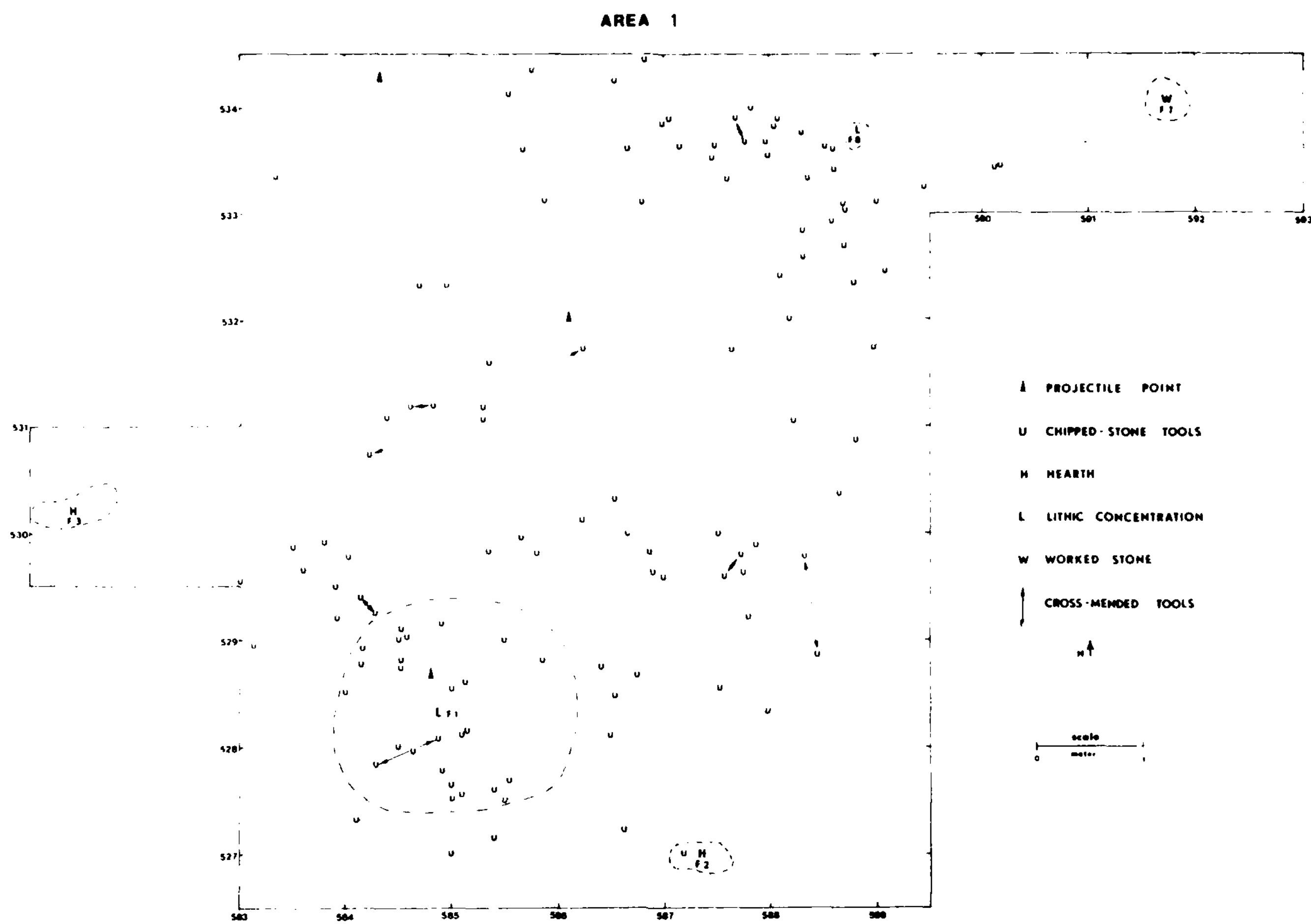


Figure 4.20 Tools and features within the main block excavation.

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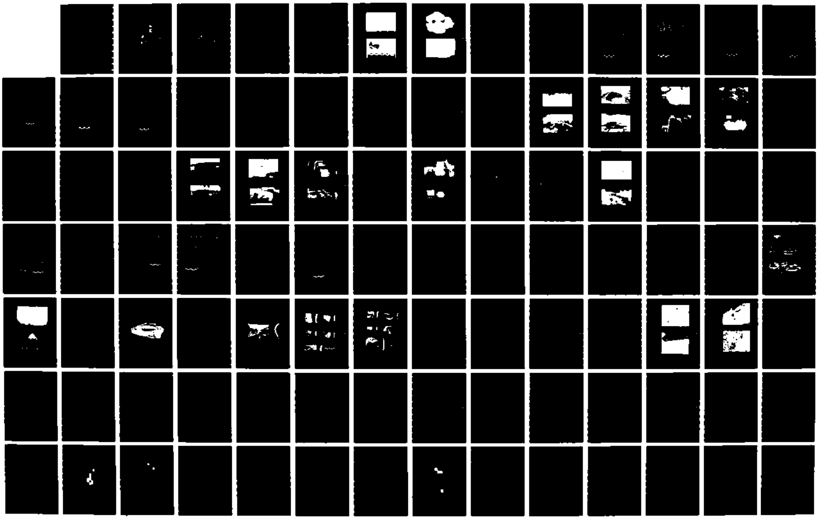

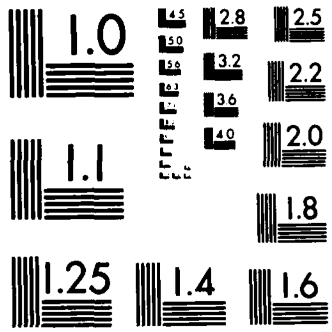

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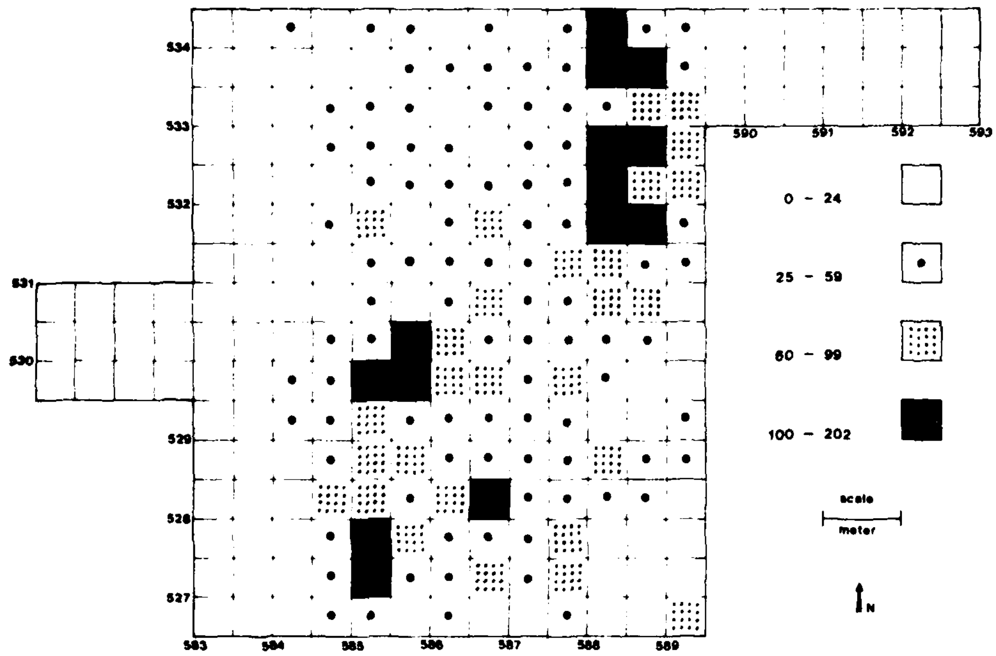


Figure 4.21 Debitage counts within the main block excavation.

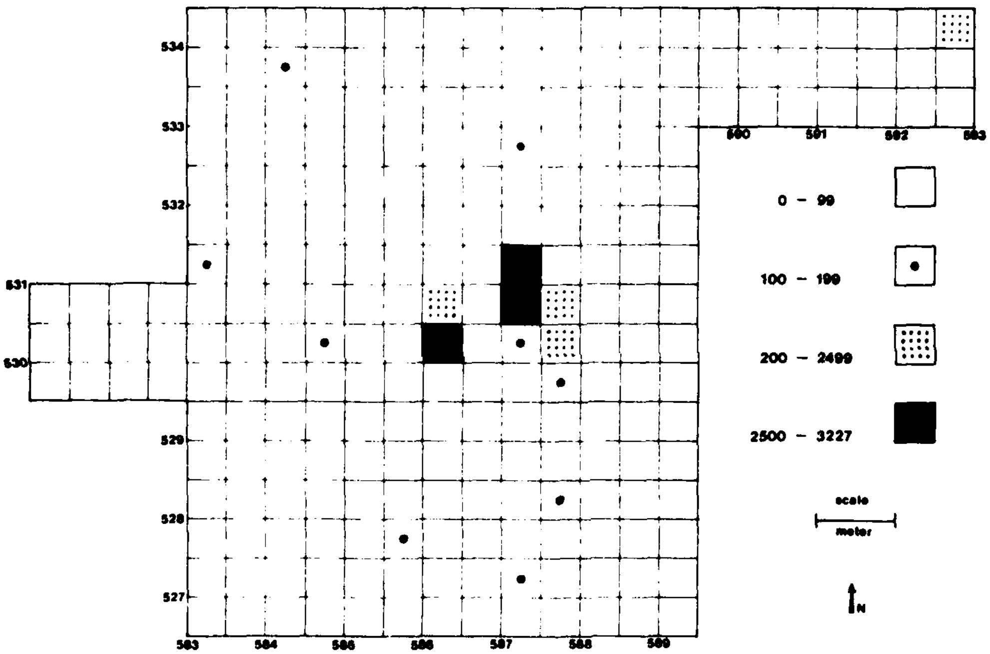


Figure 4.22 The distribution of limestone (in grams) within the main block excavation.

The near absence of serviceable bifaces at 23JA40 can be explained by the fact that such tools would be packed-up and taken along with the inhabitants when they abandoned the site.

Other Artifacts

Artifact types other than chipped stone are presented in Table 4.6.

The baked clay objects from features 5 and 6 deserve further discussion. Those from feature 5 (Fig. 4.23a) occur in various rounded, oblong shapes. Each of the two specimens from feature 6 (Fig. 4.23b) is generally spherical, with one side flattened. Clay balls similar to the latter are common in Late Archaic Poverty Point sites of the Gulf Coast (Webb 1968). Such specimens are also found throughout the Mississippi Valley (Webb 1968). The function of the baked clay objects from 23JA40 is unknown. However, their presence in a hearth and among hearth cleaning debris suggests that they had something to do with the food cooking process.

The artifact shown in Fig. 4.24b is a large quartz cobble recovered from the stripped surface at 23JA40. It was some distance from the 1978 excavations, being located at 567.84 east and 526.20 north. Since it was found *in situ* below plow zone, it is assumed to be associated with the Early Woodland component.

The cobble appears to have served two functions. Two sides (not shown) are ground smooth, indicating that it was used as a grinding stone. One side (shown) has a large pit, suggesting that the cobble also served as an anvil. Such pits are commonly formed when nuts are cracked on an anvil (Spears 1975:89).

Faunal Remains

Several hundred pieces of unworked bone wre recovered from 23JA40. Since most are small fragments, only 39 could be identified. Of these, nearly one-half (19) are deer (*Odocoileus* sp.) teeth fragments and postcranial bones. The other fauna represented include squirrel (*Sciurus* sp.), plains pocket gopher (*Geomys bursarius*), eastern mole (*Scalopus aquaticus*), ground squirrel (*Citellis* sp.), mouse (*Peromyscus* sp.), and turtle (*Chrysemys* sp.).

Most of the identifiable bone was recovered from the main block excavation. Of the features, only feature 6 yielded identifiable bone; eastern mole and mouse were represented.

Only three of the identified animals, deer, squirrel, and turtle, have potential as food resources. All three could have been procured from the immediate vicinity of 23JA40. Deer are adapted to forest and forest margins. Squirrel inhabit the forest. The turtle represented is an aquatic species which could have been procured from the nearby Little Blue River.

The remaining animals represented are small and probably not worth the effort to procure for food. In addition, all of these animals are fossorial and their presence in the site could be interpreted as intrusive.

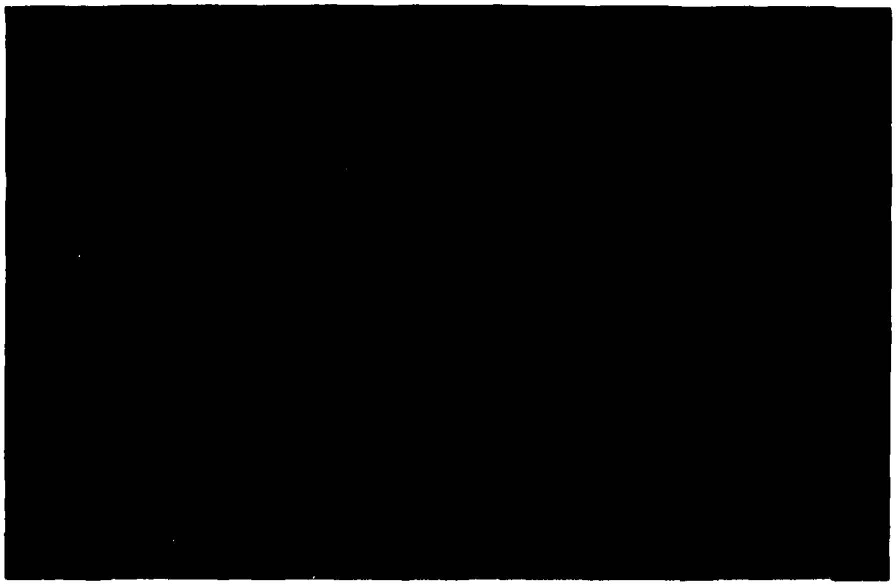
Floral Remains

Identifiable floral remains from 23JA40 are presented in Table 4.7. Only a small quantity of charred seeds were recovered from, 23JA40. Again, all of the remains (*Polygonum*, *Euphorbia*, *Stellaria*, *Geranium*, *Verbascum*, and grass family) represent plants which grow well in floodplain forests or waste areas (Jones and Bell 1974:1-11). Only *Polygonum*

Table 4.6

Artifacts Recovere from the 1978 Excavations at 23JA40

Artifact Class/Code	
Chipped Stone	9040
Hematite (1030)	107
Metate (1040)	1
Nutting Stone (1060)	1
Limestone (1070)	688
Unworked Stone (1080)	91
Burned Earth (1090)	182
Modern (2000)	4
Baked Clay Objects	9



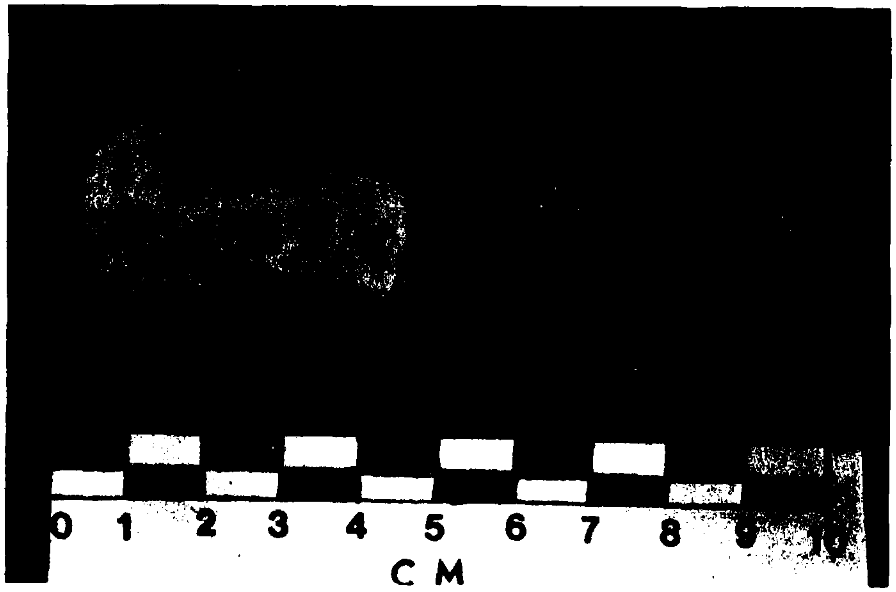


Figure 4.23 a. Clay objects from feature 5.
b. Clay balls from feature 6.

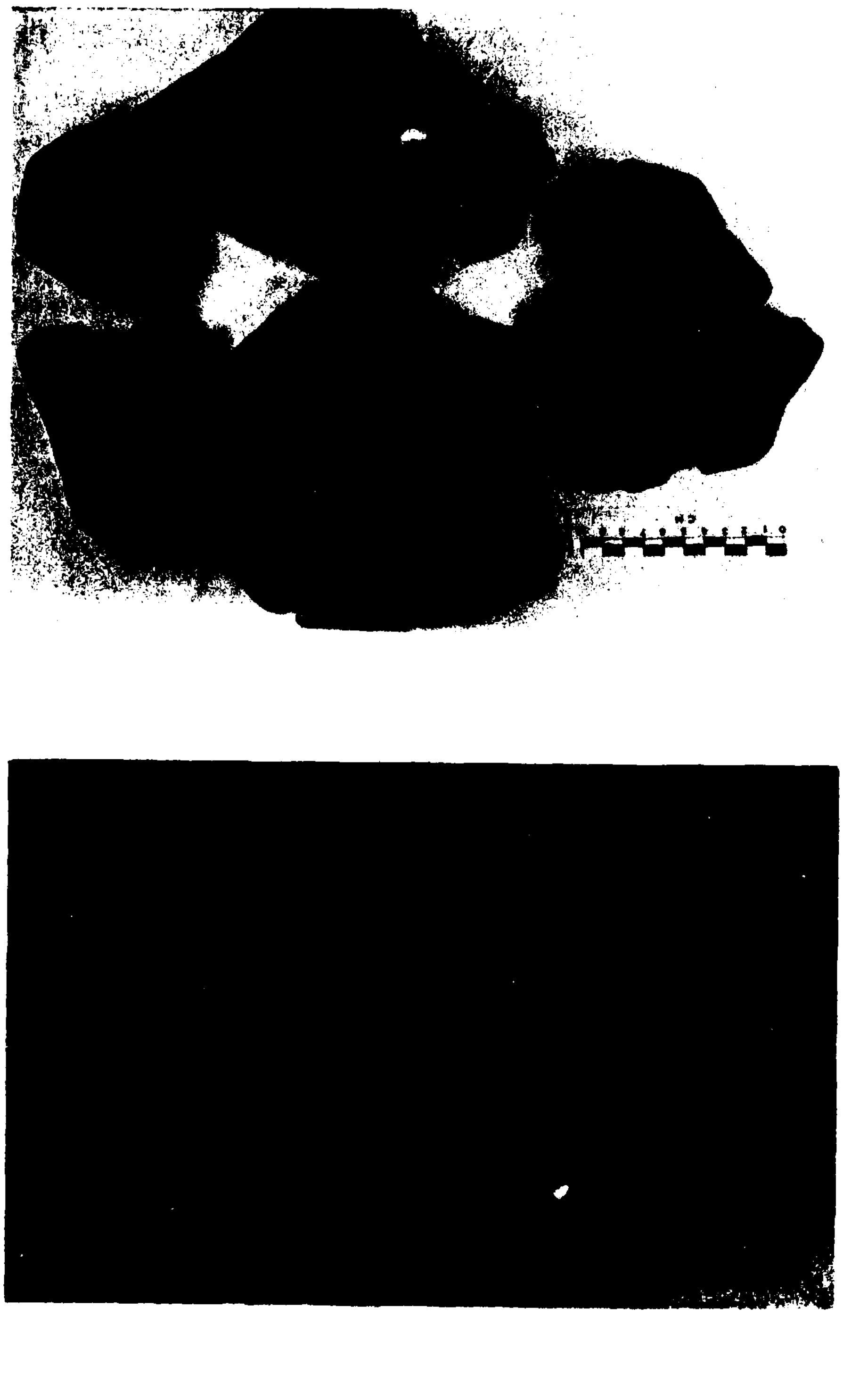


Figure 4.24 a. Feature 7, a sandstone metate, reconstructed.
b. Pitted cobble.

Table 4.7

Identifiable Floral Remains from 23JA40

Family	Genus	Common Name	Charred	Not Charred
Caryophyllaceae	Stellaria	Chickweed	2	
Euphorbiaceae	Euphorbia	Mat Spurge	3	
Geraniaceae	Geranium	Cranesbill	3	
Gramineae	Grass	Grass	2	2
Polyganaceae	Polygonum	Smartweed	1	12
Serophulariaceae	Verbascum	Mullein	5	

produces edible seeds; these are available from September to November (Zawacki and Hausfater 1969:50).

A considerable number of charred seeds were recovered from hearths and hearth debris at 23JA40, suggesting their use as food. Hearths, features 4 and 6, yielded 40 and 64 charred seeds respectively. Hearth debris, features 3 and 5, contained only one and 12 charred seeds respectively. Unfortunately, the number of identifiable charred seeds from all features totaled only six. These include Euphorbia (2), Polygonum (1), Stellaria (2), and grass (1).

Summary and Conclusions

Investigations at 23JA40 West indicate that cultural debris was mostly confined to the plow zone. Only two diagnostic artifacts were recovered: a small projectile point indicative of the Maybrook complex, and a large projectile point which dates to Middle Woodland times or earlier.

Investigations at 23JA40 indicate severely disturbed cultural deposits in the plow zone, and undisturbed deposits below the plow zone. Diagnostic artifacts from the plow zone suggest a number of cultural affiliations dating from Late Archaic through Late Woodland and possibly later.

Undisturbed cultural deposits below the plow zone indicate Early Woodland occupations. A radiocarbon date of A.D. 100±140 (UG-2350) from feature 2 within the main block excavation, and diagnostic artifacts also from this area, suggest a terminal Early Woodland occupation. A functional analysis of artifacts suggests that the occupation in this portion of the site was a small, probably temporary, hunting and gathering campsite in which two primary activities were carried out: (1) the manufacture of heavy and light-duty tools; and (2) the cutting and scraping of medium hard to hard materials.

An earlier occupation of 23JA40 is indicated by a date of 350±100 B.C. (UGa-2351) from feature 6. Little is known about this component because very little cultural debris was recovered. Most interesting, are clay objects similar to those found throughout the Mississippi River Valley. The exact function of the specimens from 23JA40 is unknown; both were associated with hearths, thus it was suggested that they had some function in the food cooking process.

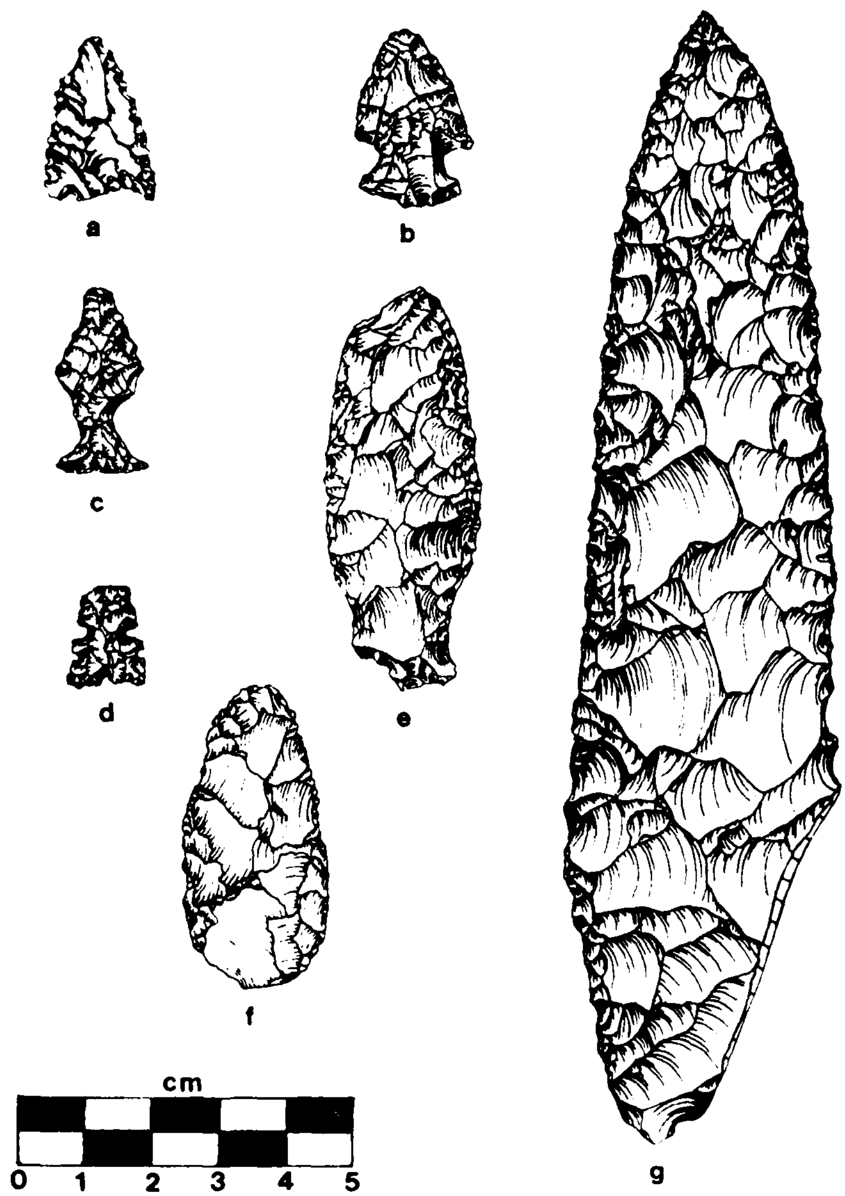


Figure 4.25 Invasively modified artifacts from 23JA40: a. projectile point (A0719577) b. projectile point (A0050377) c. projectile point (A0505277) d. projectile point (A2055778) e. projectile point (A0548177) f. biface (surface) g. knife (A2096478).

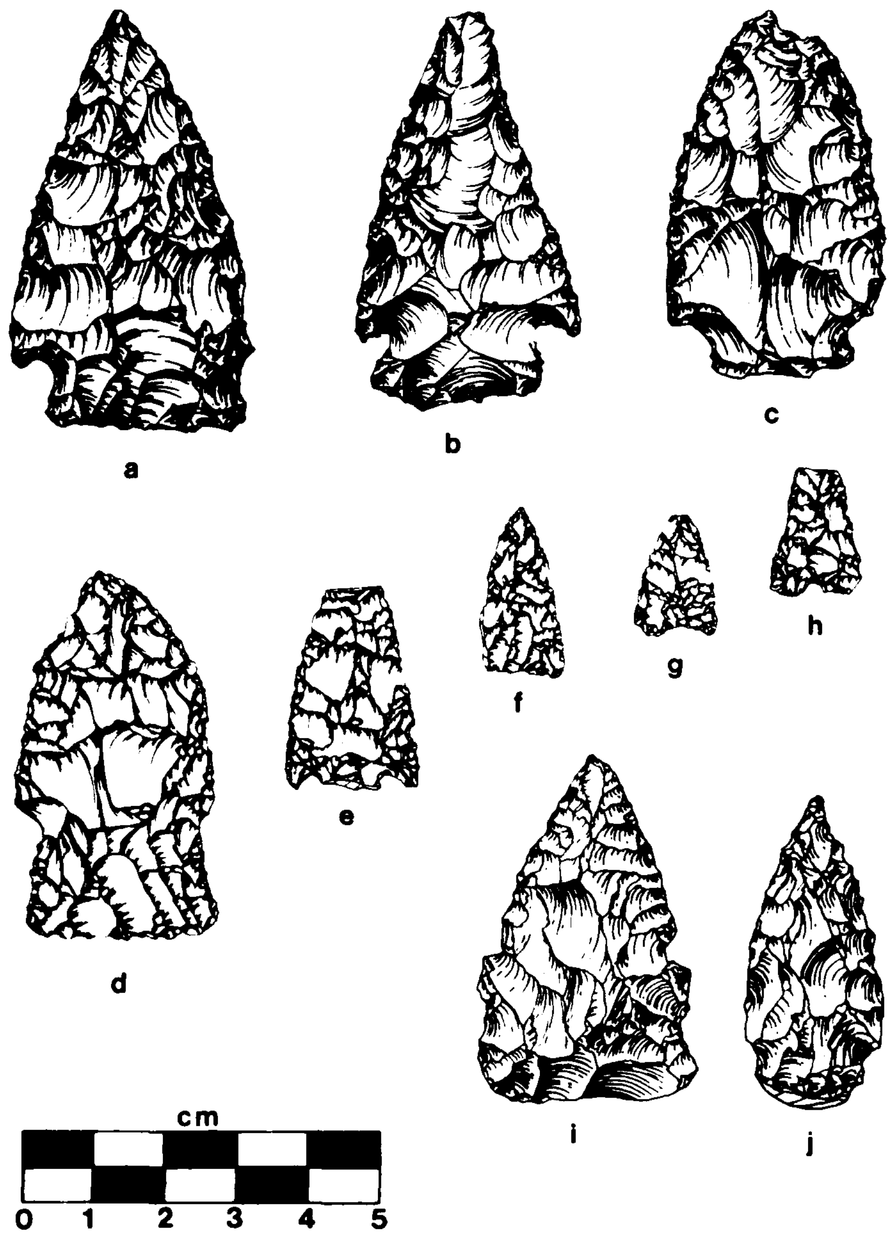


Figure 4.26 Projectile points from 23JA40: a-c. recovered from area stripped in 1978 d-h. surface i. A00558077-2 j. A0558877.

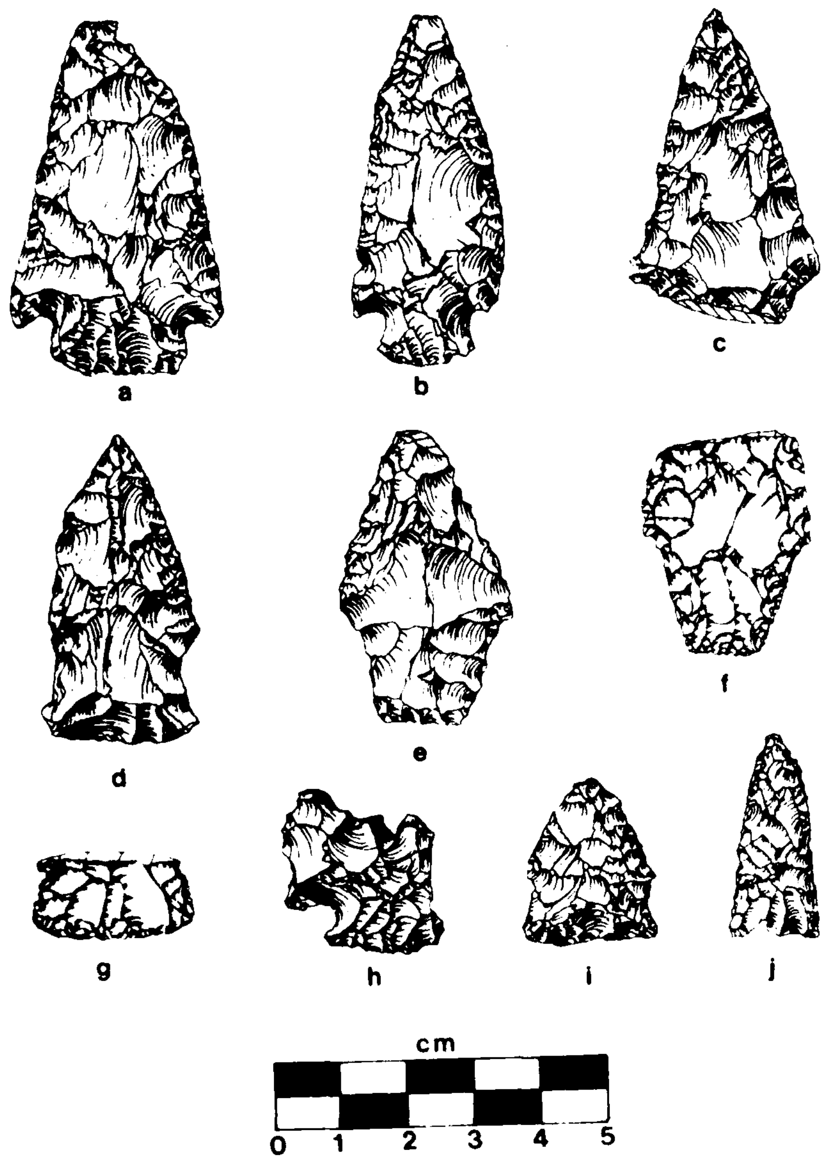


Figure 4.27 Projectile points from 23JA40: a. A0576277 b. A0564877 c. A0542177 d. A0509477 e. A0563277 f. A0101777 g. A0717077 h. A02108078 i. A0548577 j. A0533877.

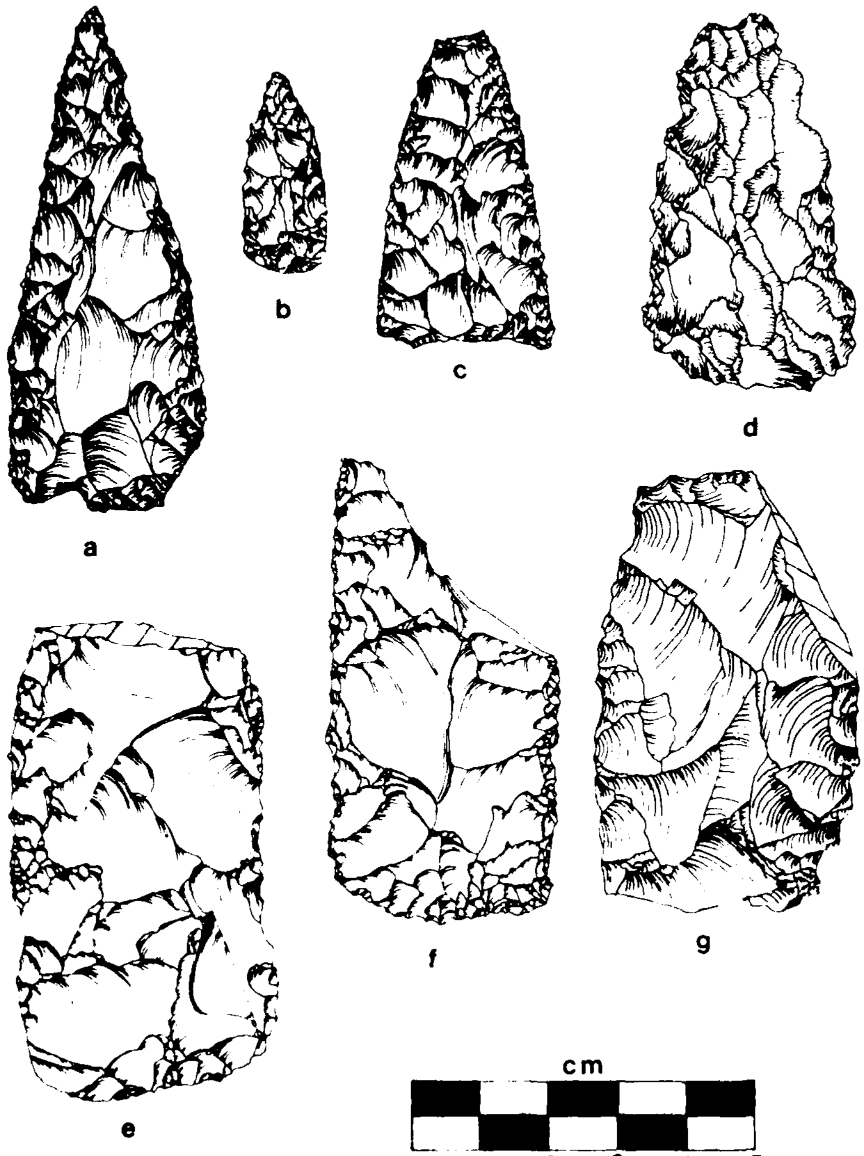


Figure 4.28 Invasively modified artifacts from 23JA40: a. projectile point (recovered from stripped area) b. projectile point c. projectile point (A2036078) d. preform (A0540377) e. knife (A02084578) f. knife (A2048078) g. preform (A0818677).

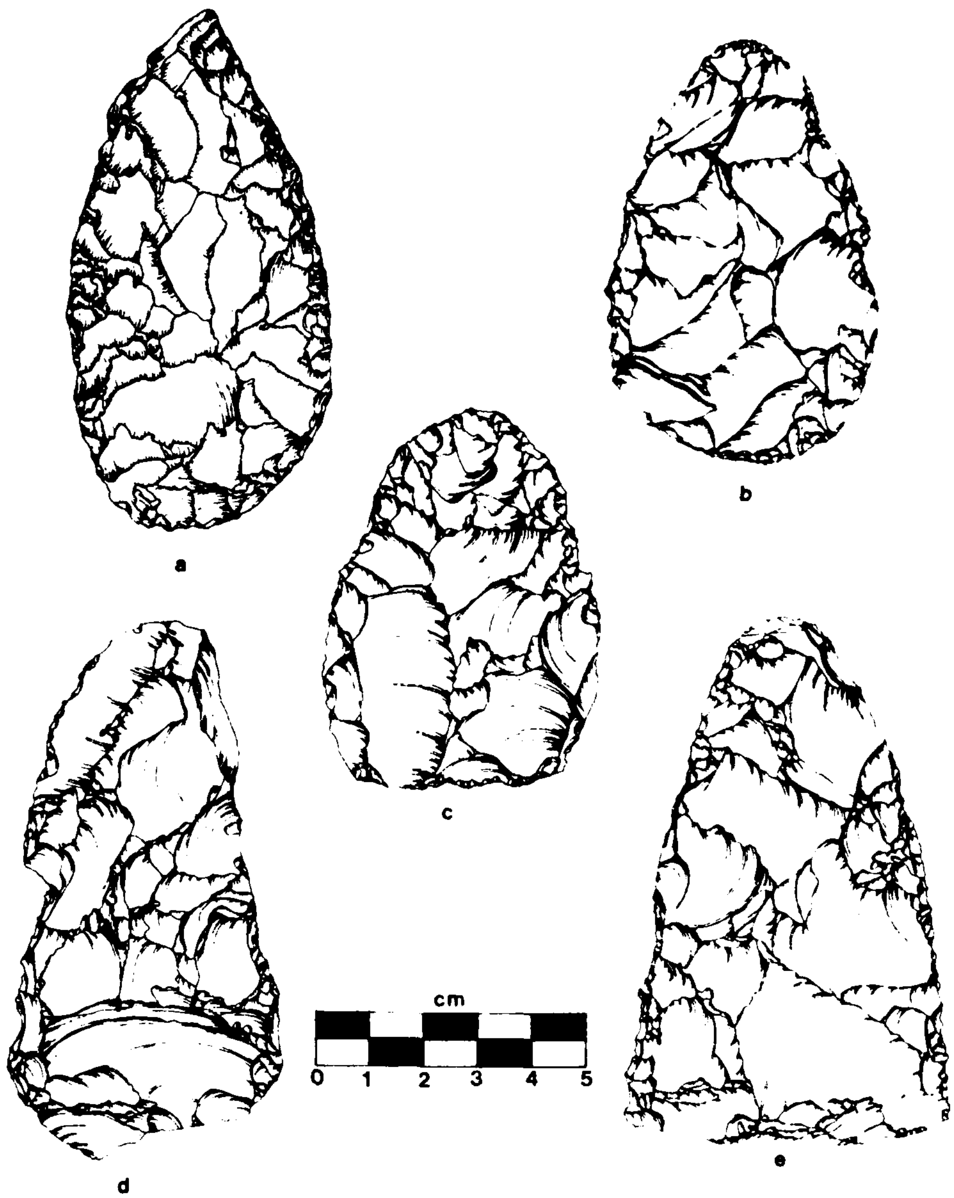


Figure 4.29 Invasively modified artifacts from 23JA40:
a. knife (A0533377) b. preform (A2065278)
c. preform (A2059278) d. preform (A2023678)
e. preform (A2003978).

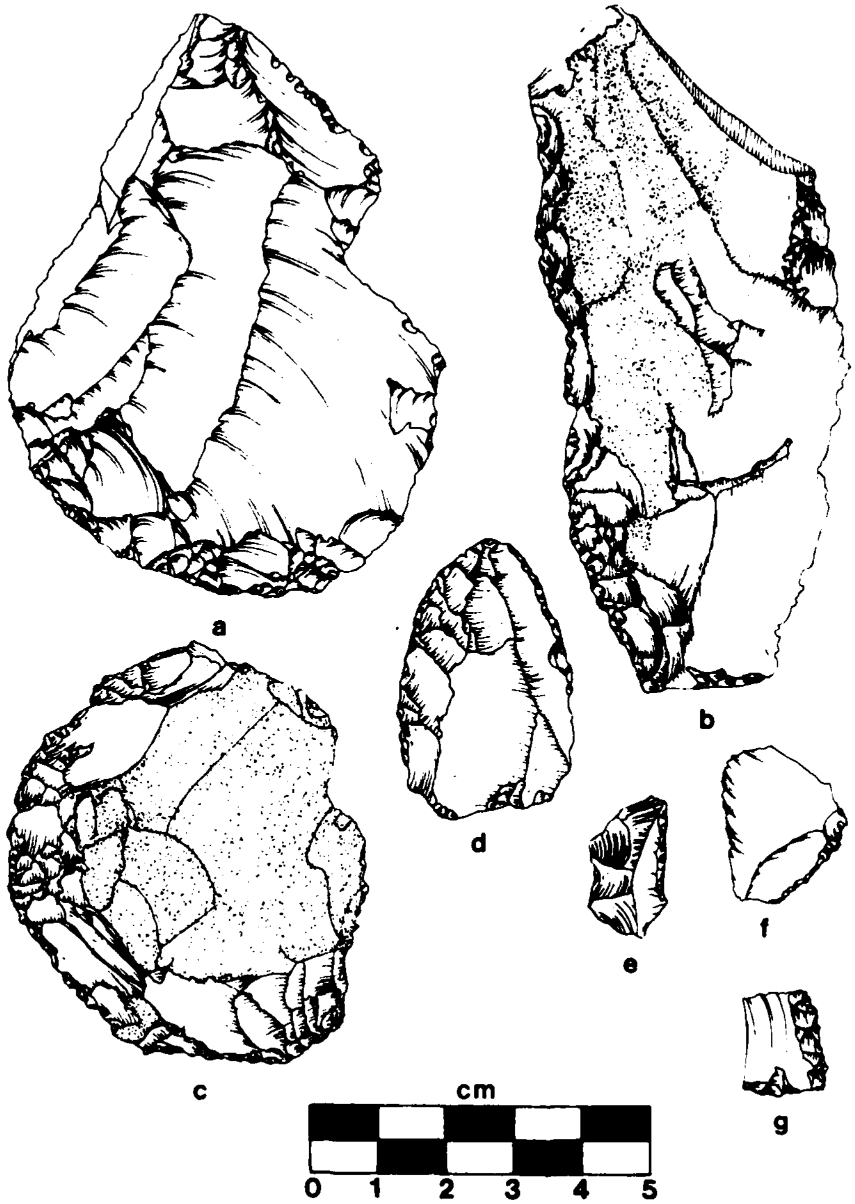


Figure 4.30 Invasively and marginally modified artifacts from 23JA40: a. preform (A2102278) b. tabular piece (A0544477) c. preform (A0533977) d. scraper (A0525377) e. flake (A0812477) f. flake (A055478-1) g. flake (A2050178).

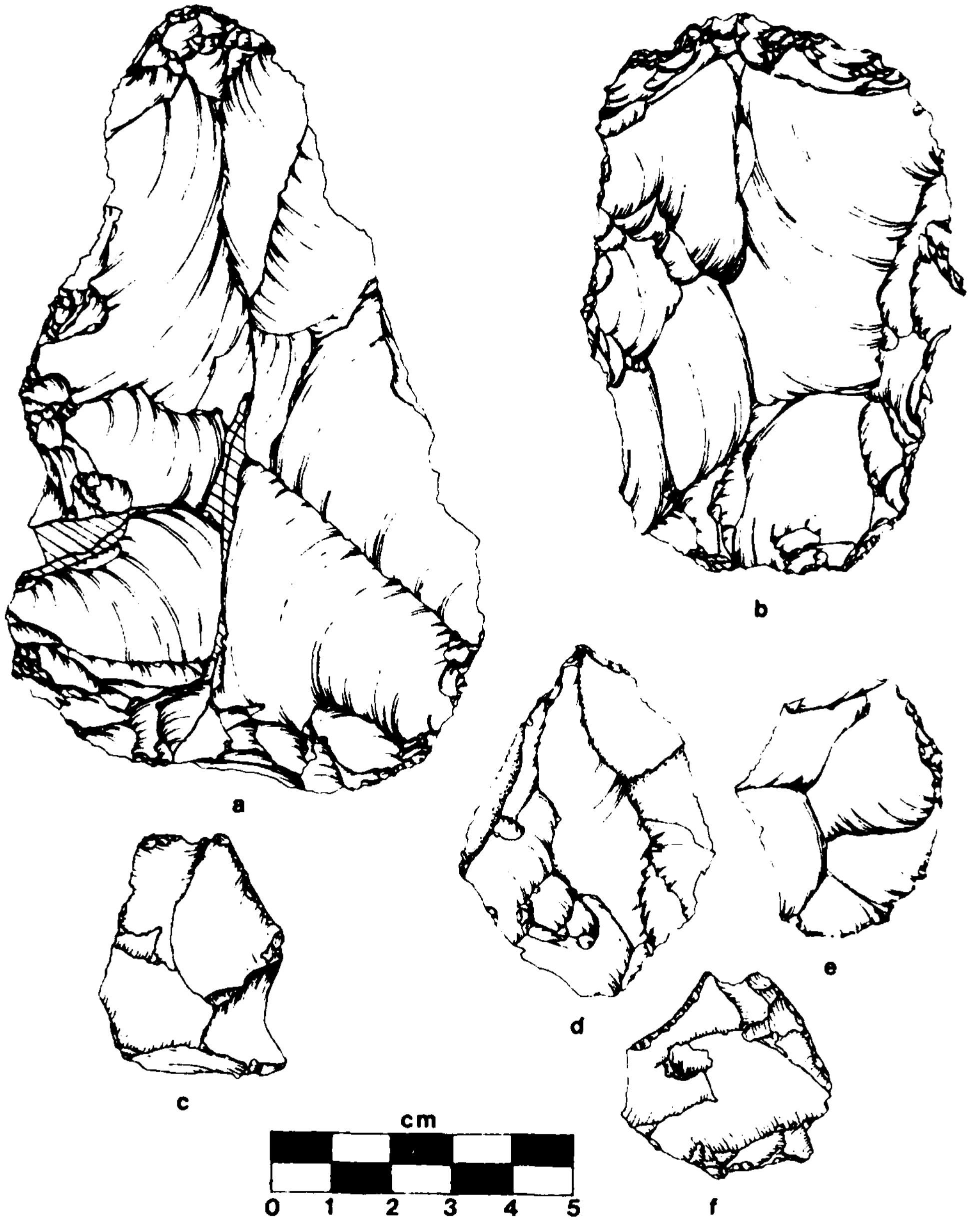


Figure 4.31 Invasively and marginally modified artifacts from 23JA40: a. preform (A2016978) b. preform (A2005378) c. flake (surface) d. flake (A2102178) e. flake (A2050078) f. notch (A0726177).

CHAPTER 5

Excavations at the Sperry Site, 23JA85
by
Kenneth L. Brown

Introduction

The Sperry site has been known for many years, and several local collectors have collections from 23JA85. The site was not formally reported until 1967 by Walter Klippel of the University of Missouri. A survey team from the University of Kansas tested portions of the site in 1975. During these tests a total of eight 2 x 2 m^2 were manually excavated. These test pits were dug to a depth of between 30 and 40 cm below the surface of the ground. The plow zone extended to a depth of 20 cm and appeared sterile of cultural materials. Beneath the plow zone was also sterile of cultural materials.

Subsequently, a controlled surface collection was made on a 1.5 hectare portion of the field. Concentrations of cultural debris suggested the site was located west of the eight test pits. The highest concentration of debris was located near the intersection of the slope with the floodplain. Testing subsequent to the controlled surface collection was not possible (Heffner and Martin 1976:17-30).

During June 9 to July 29, 1977, a 12-person crew conducted a surface grab sample, test excavations, and extensive excavations at 23JA85. A total of 396 man-days were required to excavate the site. During initial examination, the site was covered with grass and no cultural materials could be located on the surface. In an effort to determine the boundaries of the site, a 5400 m^2 portion of the field was plowed. After a heavy rain a surface collection was made.

Test excavations consisted of 22 1 x 1 m test pits. Placement of these pits was based on information from the previous survey (Heffner and Martin 1976:17-30). The test pits were manually excavated to depths of 50 cm to one meter. Test pits excavated near the edge of the second terrace revealed buried, undisturbed, cultural remains immediately below the plow zone.

Diagnostic artifacts recovered from the controlled surface collection in 1975 and test excavations in early 1977 suggested a multi-component site. Projectile points suggested Middle and Late Archaic components and a Late Woodland component were present. Pottery sherds, with plain and cordmarked exteriors, also suggested a Late Woodland component (Brown 1979).

Environmental Setting

The Sperry site, 23JA85, is located on the second terrace and slope on the east side of the Little Blue River. It is in the NW¼, SW¼, NE¼, Section 10, township 49N, range 31W, on the U.S.G.S. 7.5 minute Blue Springs quadrangle. The site is about 24 stream km or 17 km by air from the confluence of the Little Blue and Missouri Rivers. At the site, the Little Blue River is bounded by steep banks three to four meters in height. Along this section of the river, the river valley varies from 1 to 1.2 km in width. The east boundary of the Sperry Site is bounded by bluffs. The soils on which the site is located belong to the Blackoar-Zook alluvial soils of small streams.

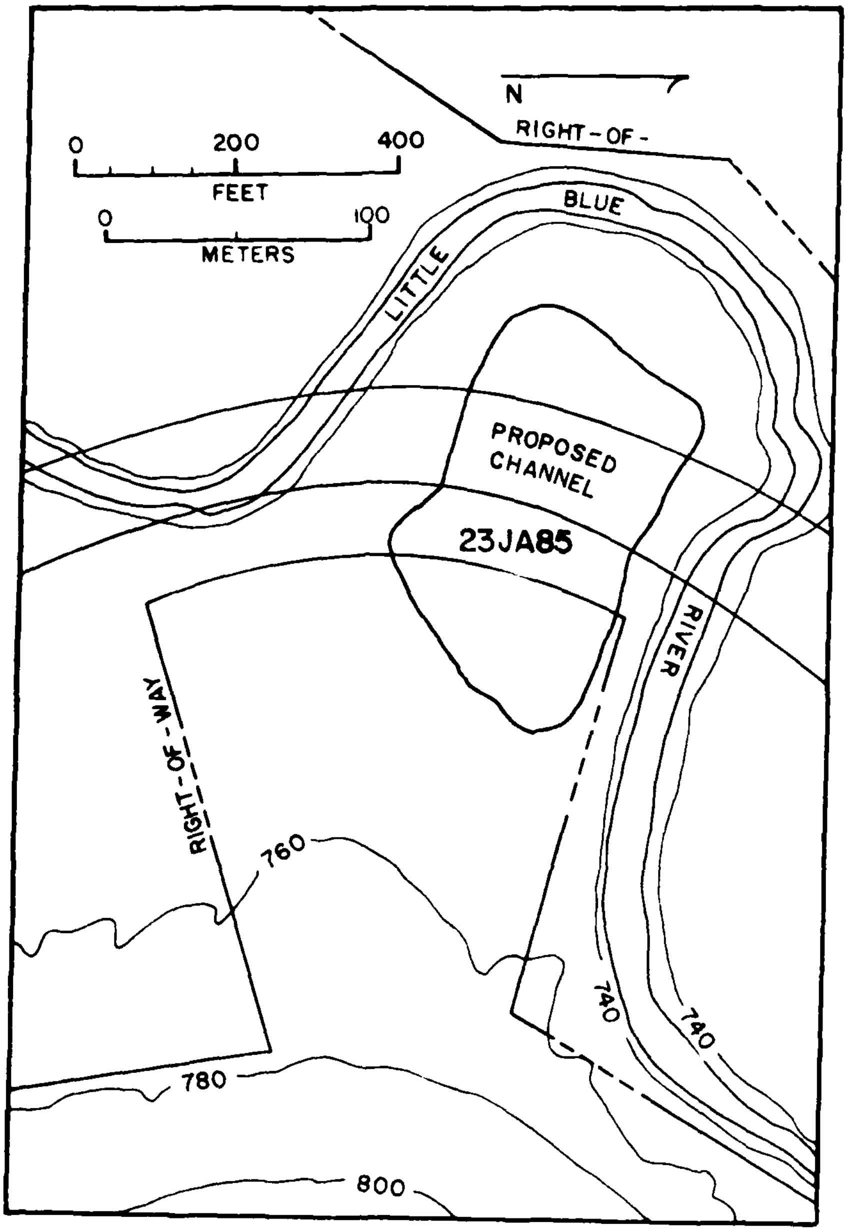


Figure 5.1 Map number 1, showing the location of the Sperry site, 23JA85, and the river channelization (see Figure 1.1).

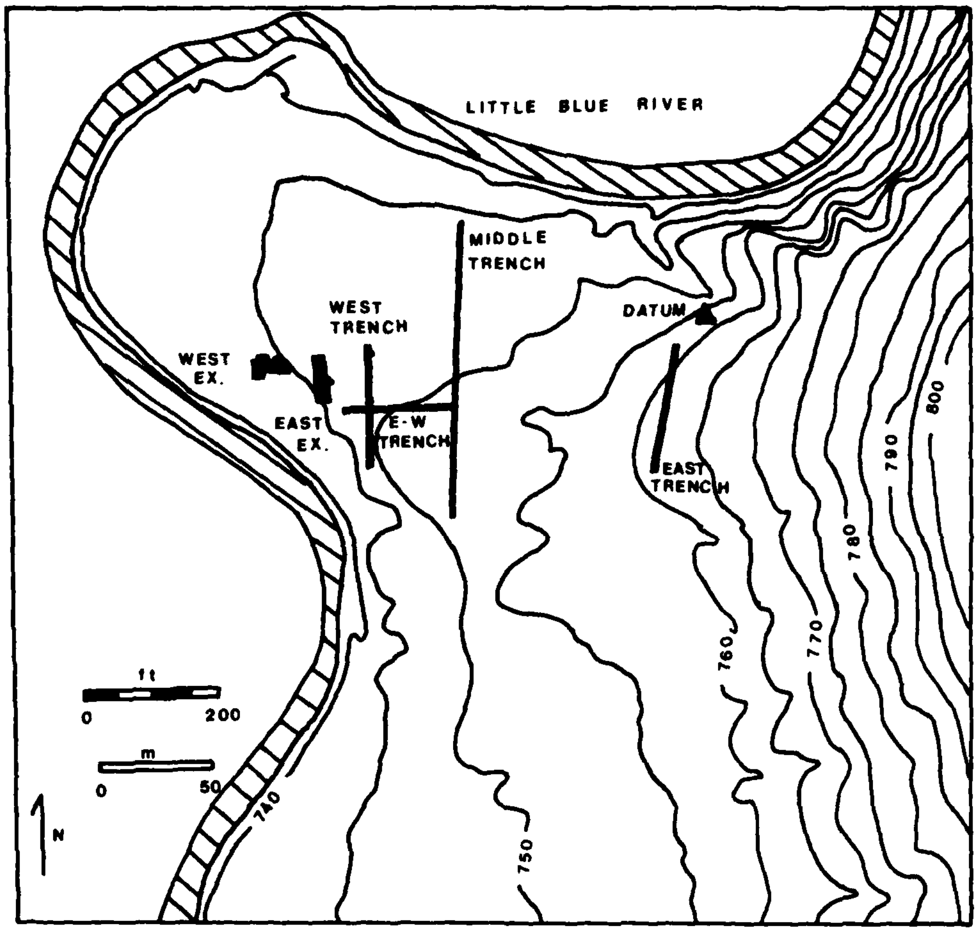


Figure 5.2 Map showing the locations of the contiguous excavation units and backhoe trenches at 23JA85.

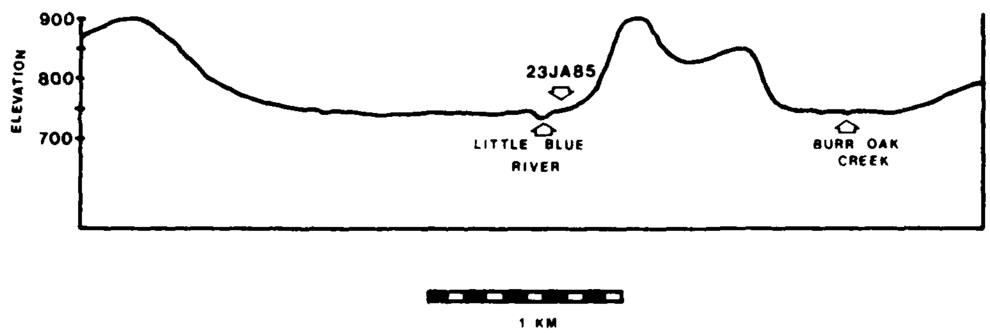


Figure 5.3 Schematic profile of the Little Blue River Valley at the Sperry site.

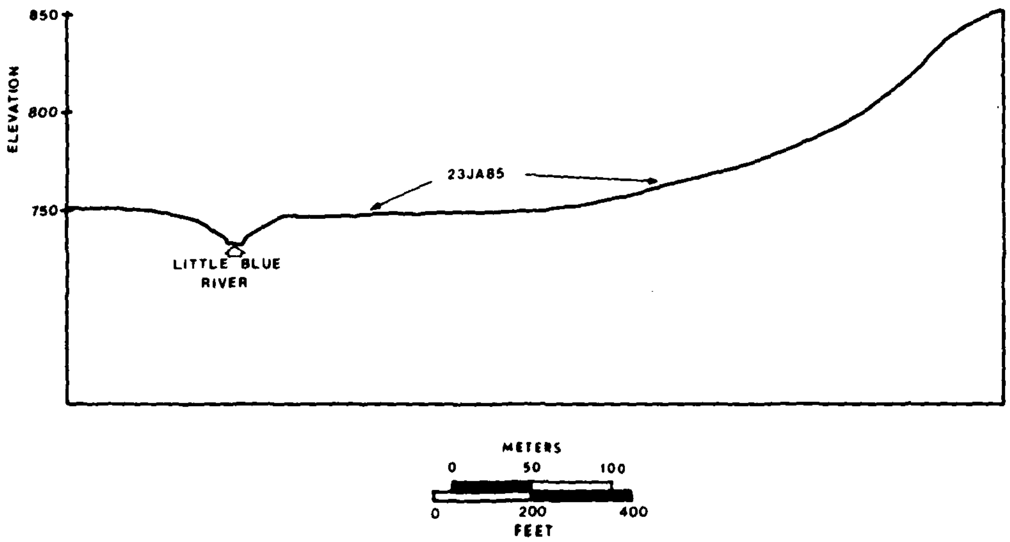


Figure 5.4 Schematic profile of the Sperry site showing the potential for colluvial deposition.

Excavation

The strategy of excavation was to extend the manual digging in those areas of the site where undisturbed cultural deposits had been located. This additional excavation was in the form of contiguous excavation units. In addition to the recovery of artifacts, other forms of data taken included soil samples for micro-floral, micro-faunal and micro-lithic analyses. The excavation of contiguous units was initially begun in a one meter wide, 18 meter long trench located 320 meters east and 466 to 483 meters north. The same datum used for the 1977 test pits was used for these excavations.

Initially, all soils were screened through ¼ inch hardware cloth (Fig. 5.5 (a)). The plow zone was removed in 1 x 1 m^2 units and sub-plow zone soils were dug in 50 cm^2 units and arbitrary 5 cm levels. The trench allowed delimitation of the thickness of the plow zone, 25 to 30 cm, and determination of the existence of a single Late Woodland occupation measuring in depth from surface to 15 to 20 cm below the base of the plow zone. A large quantity of cultural materials was recovered from the plow zone, and had thus been disturbed by modern agricultural practices. This corresponds with the area of higher soil phosphate values (See Filer, this volume).

The trench was expanded in the east and west cardinal directions. A total of 99 m^2 were manually dug in this contiguous excavation unit. This will be referred to as the east excavation. Two features and 12 post stains were discernible and subsequently excavated (Figs. 5.5 and 5.6). Soils removed from features were saved for water flotation.

Features

Feature 1, a fire hearth (Figs. 5.7 and 5.9).

Feature 1 was located at 319.70 to 320.70 meters east and 472.60 to 473.80 meters north. The top of the hearth was 25 cm below ground surface. The feature was a shallow basin with a maximum depth of 15 cm. Contents were burned earth and small pieces of charcoal. Several fragments of burnt bone were also recovered from the hearth. Preservation of the feature was very good. Since the surface of the hearth was discernible immediately upon removal of the overlying plow zone soils, the top may have been truncated by modern cultivation practices. The scatter of burned earth and limestone fragments was extensive to the west, suggesting the contents had been disturbed sometime in the past. Analysis of the contents indicate feature 1 was used as a fire hearth (O'Malley 1979:74-80).

Feature 2, a trash filled pit (Figs. 5.8 and 5.9).

This small trash pit was located 317.50 to 318.25 meters east and 475.75 to 376.45 meters north. The top of the pit was discernible at 25 cm below ground surface. The pit had slightly sloping sides and a relatively flat bottom (Fig. 5.9). The fill included charcoal flecks, burned earth, flint debris and granite, pottery, bone, charred seeds and some intrusive historical material. Densities of cultural debris declined significantly with depth. Preservation of the feature was excellent, with no discernible disturbances. Since the surface of the pit was discernible upon the removal of the overlying plow zone soils, the top of the pit may have been truncated by modern agricultural practices.

Feature 2 is identified as a trash-filled storage pit on the basis of its relatively high concentrations of bone and seeds, its shape and high incidence of discarded artifacts. Storage pits occur in abundance

Figure 5.5 a. Manual excavation and screening of soils from the trench.
b. Photograph of the east excavation unit.

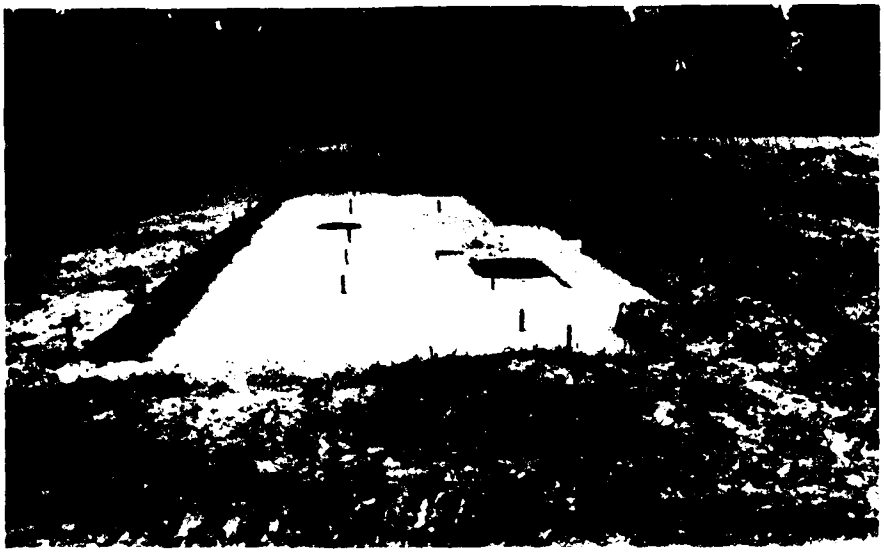


Figure 5.6 a. View of the east excavation upon its completion.
b. View of the west excavation upon its completion.

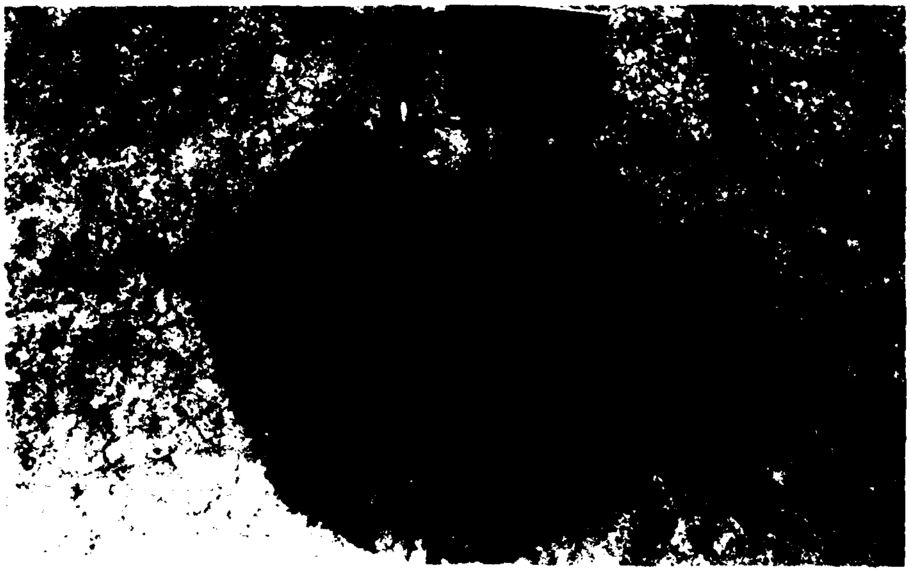


Figure 5.7 View of Feature 1 prior to its excavation.

Figure 5.8 a. Feature 2, a trash filled pit, before its excavation.
b. View of Feature 2 during its excavation.

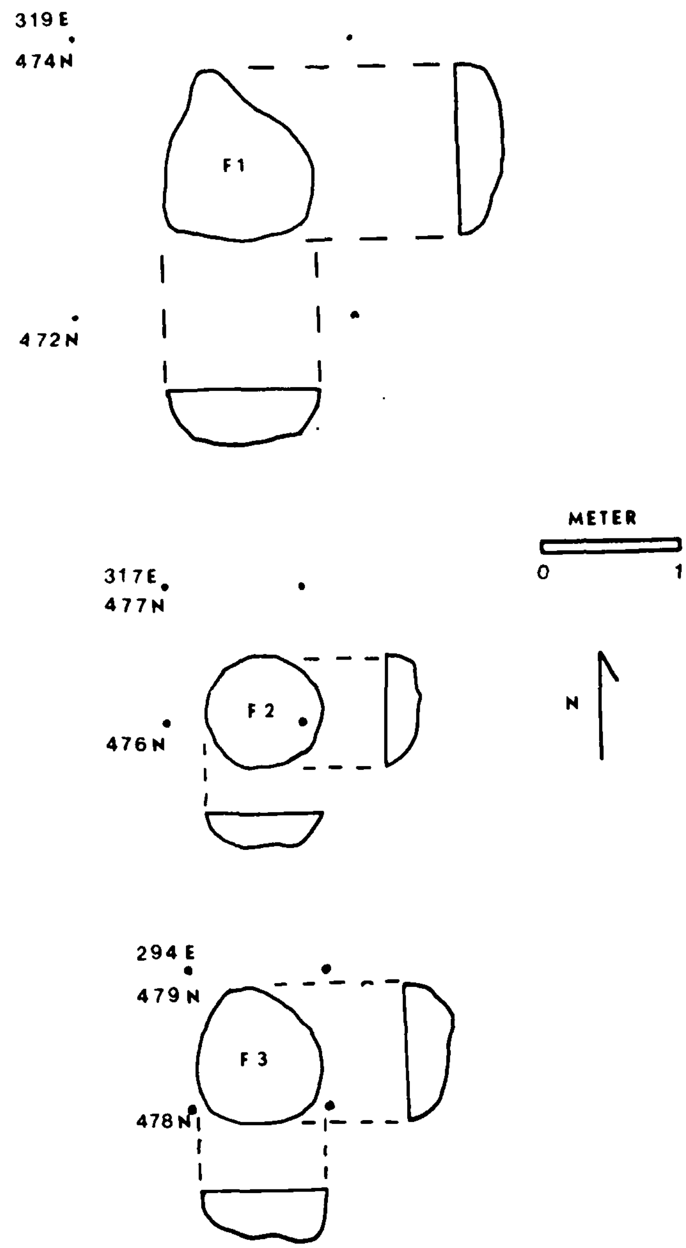


Figure 5.9 Drawings of Feature Nos. 1, 2 and 3, showing their profiles.

in many archaeological sites, particularly in Woodland and later occupations. Ethnographic accounts document the use of subterranean pits for the storage of foodstuffs (Catlin 1973:122).

Post Stains

Fifteen circular stains were exposed. Upon cross-sectioning the stains, twelve appear to have been actual postmolds. The others were old rodent burrows. Surrounding the eastern side of feature 1 were four shallow, small, circular stains (numbers 1, 6, 14 and 15, Fig. 5.36). These were postulated postmolds. The postmolds, though limited in size and depth, may be the remains of supports for a drying rack or wind screen which was placed over the hearth. The other postmolds (Fig. 5.36) do not form any discernible pattern. The recovery of a few pieces of daub, or burned earth with grass and stick impressions, suggests some sort of living structure may have been present on the site. The grass impressions on the daub were not identifiable as to genera (Dr. Ronald McGregor, director of the University of Kansas herbarium, personal communication).

Upon completing excavations in the east contiguous unit, test trenches, dug with the aid of a backhoe, revealed a concentration of cultural debris 20 meters west of the initial excavation. A shallow trench, dug with the aid of a backhoe, encountered a hearth. Subsequently, manual excavations proceeded around the hearth. This was feature 3. Manual excavations indicated a substantial quantity of in situ remains between feature 3 and the east excavation.

In order to expedite the removal of the plow zone, heavy mechanical equipment was employed to remove 490 m^2 of plow zone soils between feature 3 and the east excavation. This allowed manual excavation of an additional 61.5 m^2 of undisturbed cultural remains. Thus, two contiguous excavation units were dug. The second excavation unit is referred to as the west excavation. The manual digging of 61.5 m^2 in the west excavation revealed four features, including feature 3, and six postmolds.

Features

Feature 3, a fire hearth (Figs. 5.13 and 5.9).

Feature 3 was located at 294.10 to 294.95 meters east and 477.90 to 478.80 meters north. The top of the hearth was 33 cm below the ground surface, or about 8 cm below the bottom of the plow zone. The hearth was basin shaped and 32 cm deep. Contents were large quantities of burned earth, a few charcoal flecks and one piece of chert. Preservation of the hearth was excellent with no discernible rodent or other natural disturbances. Since the top of the hearth was 8 cm below the plow zone, the feature had not been truncated by modern agricultural practices. Analysis of the feature and its contents suggests it was a pit oven (O'Malley 1979:81).

Feature 4, a postmold (Figs. 5.14 (a)and 5.10).

Feature 4 was exposed with the mechanical earth moving equipment. Its location was 303.56 meters east and 479.15 meters north. Initially, it appeared to be a small fire hearth with a diameter of approximately 20 cm. Burned earth was removed from its contents, revealing a 10 cm, circular hole, 18 cm deep with a flat bottom. No charcoal or other cultural material were recovered from the feature. This was defined as a large postmold.

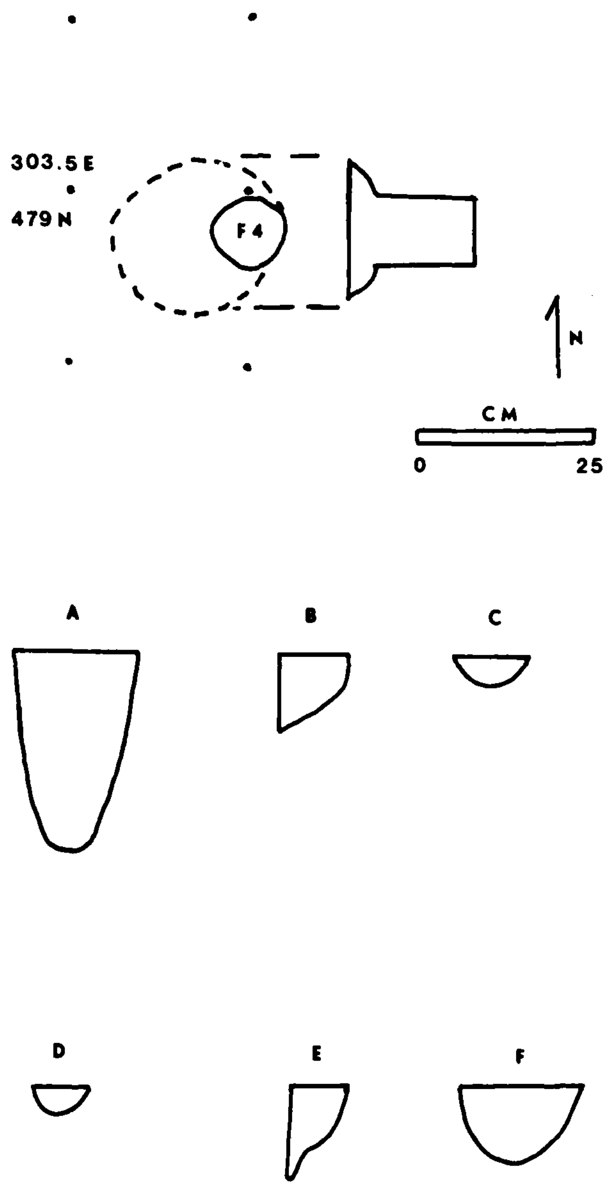


Figure 5.10 Drawings of Feature 4 and profiles of post molds in the west excavation.

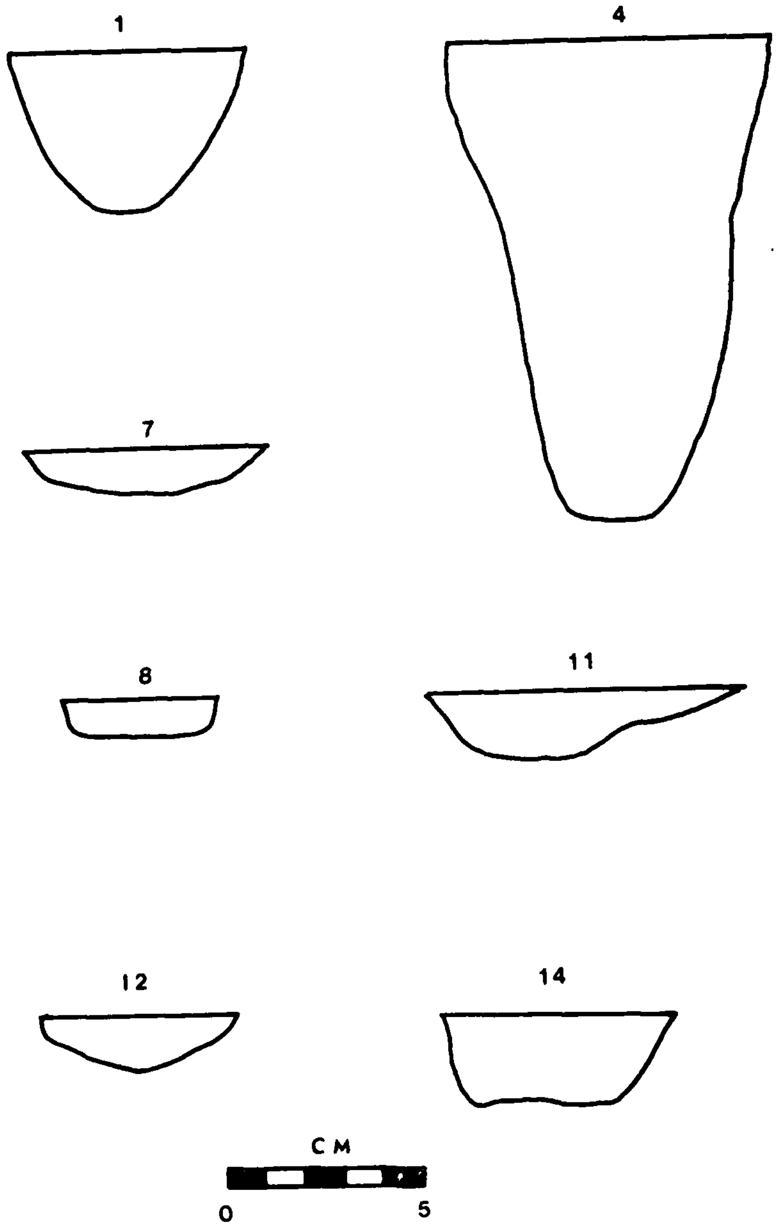


Figure 5.11 Schematic profiles of post molds in the east excavation.

Figure 5.12 a. Photograph of the backhoe digging the trenches.
b. View of the area where the plow zone was removed with the aid of mechanical equipment.

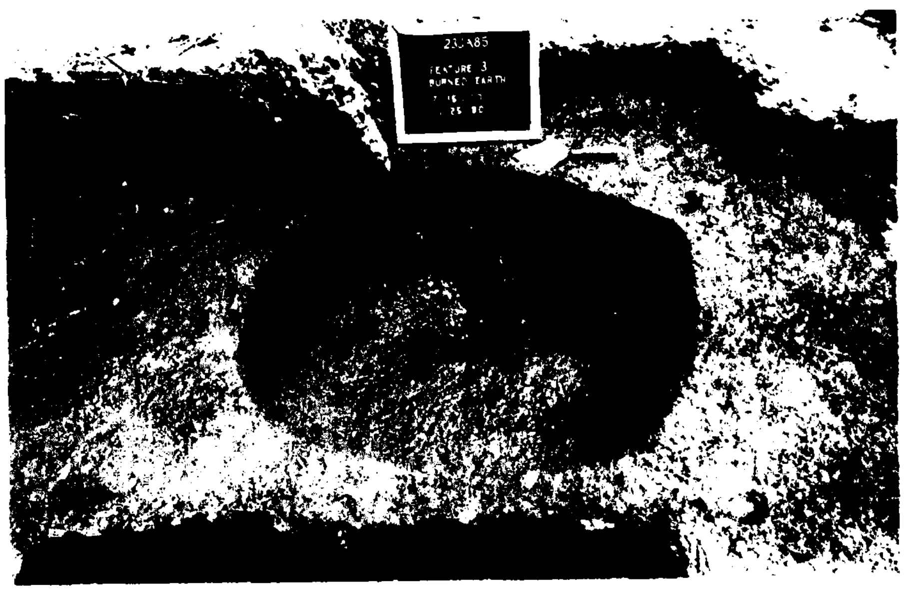


Figure 5.13 a. Photograph of Feature 3 before it was excavated.

b. Photograph of Feature 3 after it had been excavated.

Figure 5.14 a. Photograph of Feature 4 before it was excavated.
b. Photograph of exposed stones in Feature 6.

Feature 5, a trash-filled pit.

Feature 5 was discernible as a dark soil stain. Upon the removal of some of the darker soil, the discoloration disappeared. No cultural materials were recovered. The soil discoloration was considered to be due to natural agents.

Feature 6, limestone and sandstone concentration (Figs. 5.14 (b), 5.16 and 5.17).

Feature 6 was a concentration of limestone and sandstone. The stone concentration was three meters in diameter. One sandstone metate was in situ (Fig. 5.16). The feature became discernible at a depth of 30 cm below ground surface, and continued to a depth of 50 cm. Upon examination of the sandstone pieces, it became apparent several could be cross-mended. Twelve fragments articulated to form the basin of a metate. Eleven other fragments were articulated to form three sandstone slabs. One of these sandstone pieces was a grooved abrader (Fig. 5.24 (c)).

Feature 6 extended from 295.3 to 297.5 meters east and 479 to 481 meters north. The stones within the feature can be divided into the following frequencies: Limestone (28), sandstone (40), pottery (1), and chert (1). At least two metates and one grooved abrader were contained within the feature. Analysis of the feature contents indicates it was a food processing area.

Feature 7, a hide smoking pit (Fig. 5.15 (b)).

Feature 7 was a small, basin shaped pit containing large pieces of charcoal. The pit was located at 298.3 to 298.5 meters east and 480.1 to 480.3 meters north. The pit was 16 cm deep. No stones or other cultural materials were associated with the pit. The bottom of the pit had a small quantity of burned earth, suggesting the charcoal had been burned in place. The complete charring of the wood indicates burning took place in a reducing atmosphere. The physical characteristics of this small feature are interpreted as being those of a hide smoking pit. The practice of smoking hides as part of clothing manufacture was common among the native inhabitants of North America (Binford 1967: 1-12). Analysis of the feature supports the contention that it functioned as a hide smoking pit (O'Malley 1979:95-99).

Postmolds (Figs. 5.40 and 5.10).

Six postmolds were excavated in addition to feature 4, which was also a postmold. The six postmolds were lettered alphabetically, A to F, to distinguish them from postmolds found in the east excavation, numbers 1 to 15. The postmolds in the west excavation do not form a discernible pattern. These postmolds were all circular with depths of 5 to 30 cm.

Radiocarbon Dates

Three charcoal samples, one from the east excavation and two from the west, were submitted for radiocarbon dating at the Center for Applied Isotopes Studies, University of Georgia. Two samples were from feature 7. Only charcoal pieces measuring greater than 15 mm in diameter were used. Of the two samples from feature 7, the first, UGa-1867, was 5 g of charcoal and the second, UGa-1868, was 6 g. One sample, UGa-1869, was a composite of 5 g from the east excavation.

Table 5.1 shows the radiocarbon dates. The two radiocarbon dates from feature 7 are A.D. 730 ± 70 (UGa-1867) and A.D. 805 ± 60 (UGa-1868). The composite sample from the east excavation yielded a date of A.D. 695 ± 65 (UGa-1869). Since the two dates from the west excavation are from a

Figure 5.15   a.   Photograph of Feature 7 before it was excavated.
              b.   Photograph of Feature 7 after it had been excavated.

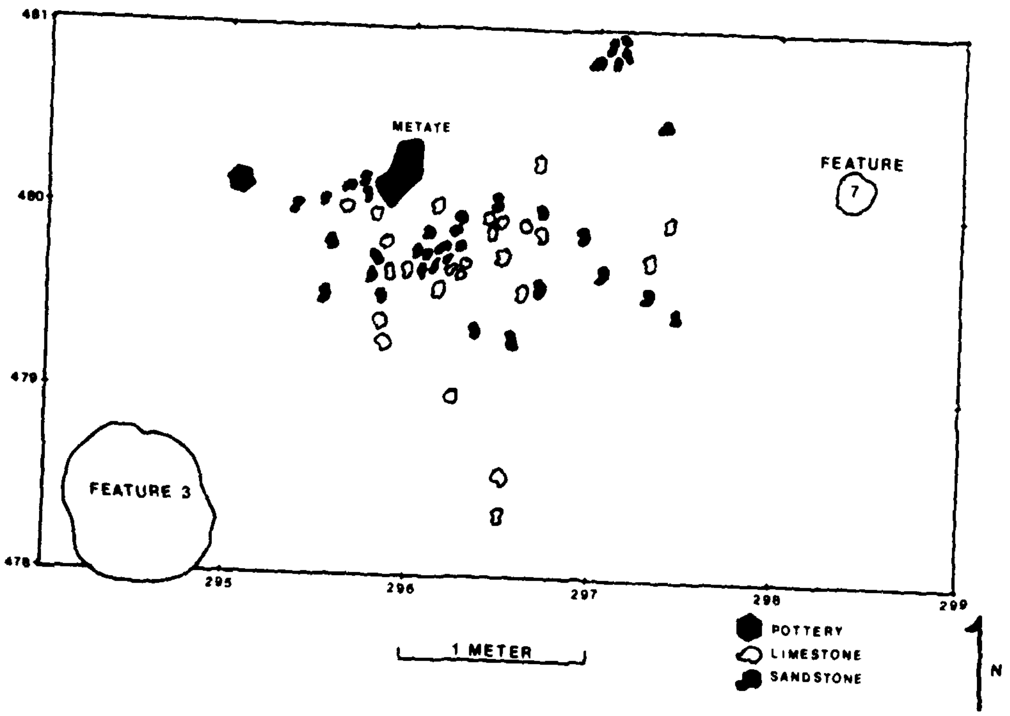


Figure 5.16 Distribution of stones in Feature 6.

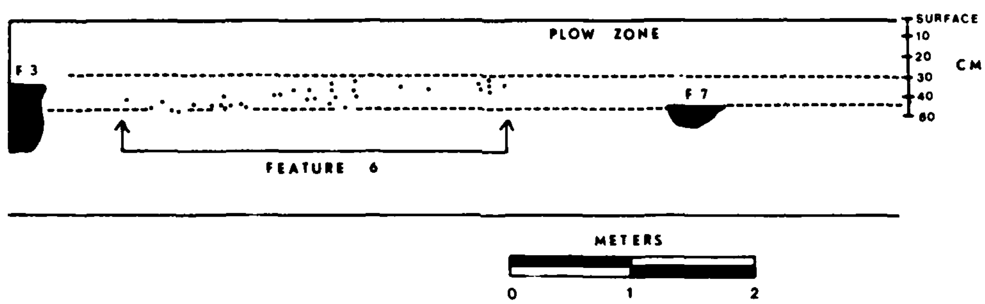


Figure 5.17 Schematic profile of Feature 6 showing the differences in stone depths.

Figure 5.18 a. Aerial view of the trenches and the east and west excavation units.
b. View of the excavated area after the new channel had been dug for the Little Blue River.

Table 5.1

Radiocarbon Dates from the Sperry Site, 23JA85

Sample	Uncorrected Date	Corrected Date
UGa-1867	1220 ± 70 B.P. A.D. 730 ± 70	1194 ± 87 B.P. A.D. 756 ± 87
UGa-1868	1145 ± 60 B.P. A.D. 805 ± 60	1123 ± 79 B.P. A.D. 827 ± 87
UGa-1869	1255 ± 65 B.P. A.D. 695 ± 65	1241 ± 83 B.P. A.D. 709 ± 87
Averaged uncorrected dates:	1170 ± 50 B.P. A.D. 780 ± 50	
Averaged corrected dates:	1205 ± 50 B.P. A.D. 745 ± 50	

The half-life of 5568 years was used in calculating these dates.

The correction table developed by Damon *et al*. (1974) was used.

common feature, they were averaged using the formula developed by Long and Rippeteau (1974). The averaged, uncorrected date of A.D. 780 ± 50 was obtained. Using the correction table developed by Damon et al. (1974), the corrected radiocarbon dates are A.D. 756 ± 87 (for UGa-1867), A.D. 827 ± 87 (for UGa-1868), and A.D. 709 ± 87 (for UGa-1869). The averaged, corrected radiocarbon date from feature 7 is A.D. 745 ± 50.

The radiocarbon dates and associated artifacts from the east and west excavations place the component as being Late Woodland. The radiocarbon dates also suggest the cultural remains from the west and east excavations are contemporaneous.

Description of the Artifacts Recovered from the Sperry Site, 23JA85.

The following is the description of artifacts recovered from the east and west excavations at the Sperry site. The classification system used is in Figure 5.19.

Category 100: Unmodified Chips (N = 1093) + (chips recovered from flotation = 1295).

Of these, only 27 are made from Westerville chert, the others are of Winterset. Flotation of 2082 liters of soil resulted in the recovery of an additional 1295 chips.

Category 105: Utilized Chips (N = 62).

Winterset chert was used in the production of 56 of these; six are of Westerville chert.

Category 110: Modified Chips (N = 29).

Of these, 29 have continuous and four have discontinuous retouch. Two chips are made of Westerville chert, the others are of Winterset chert.

Category 200: Unmodified Shatter (N = 495).

None of the unmodified shatter has discernible wear. Most of the shatter is of Winterset chert, but four pieces are of Westerville, two are of heated Westerville and one is of Argentine.

Category 210: Modified Shatter (N = 22)

Of these pieces of modified shatter, 18 have continuous and three have discontinuous retouch. Two shatter specimens are made of Westerville chert and 27 are of Winterset.

Category 300: Unmodified Flakes (N = 295).

Most of these flakes are made of Winterset chert but 22 are of Westerville.

Category 305: Utilized Flakes (N = 89) (Fig. 5.20 (c)).

These flakes are all made from Winterset chert.

Category 320: Modified Flakes (N = 54) (Fig. 5.23: (c), (d), (e), (f), (g)).

Of these, 33 have continuous and 21 have discontinuous retouch. Eight flakes are made of Westerville chert and 46 are of Winterset.

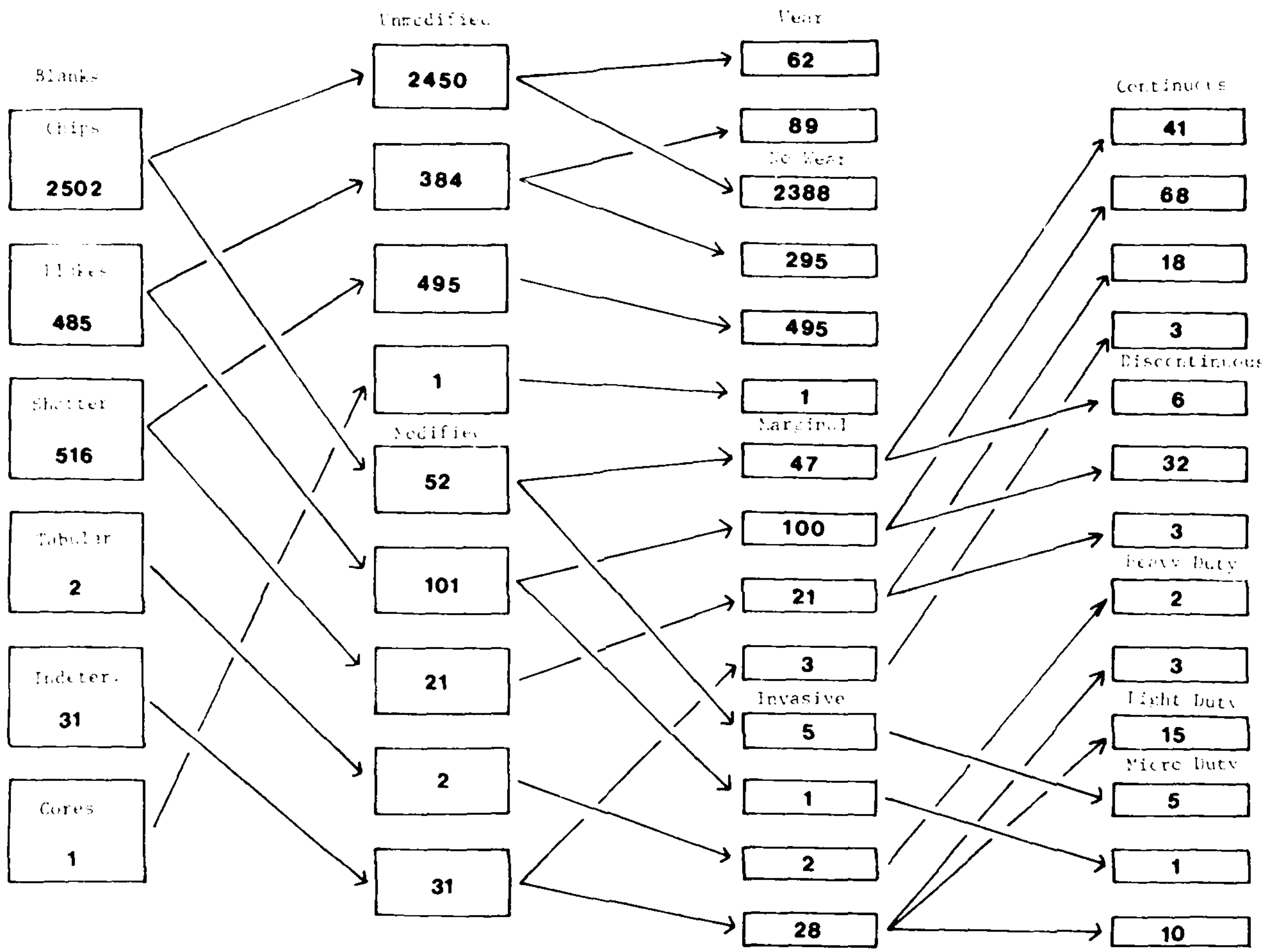


Figure 5.19 Flow chart showing the frequencies of artifacts recovered from the east and west excavations at 23JA85.

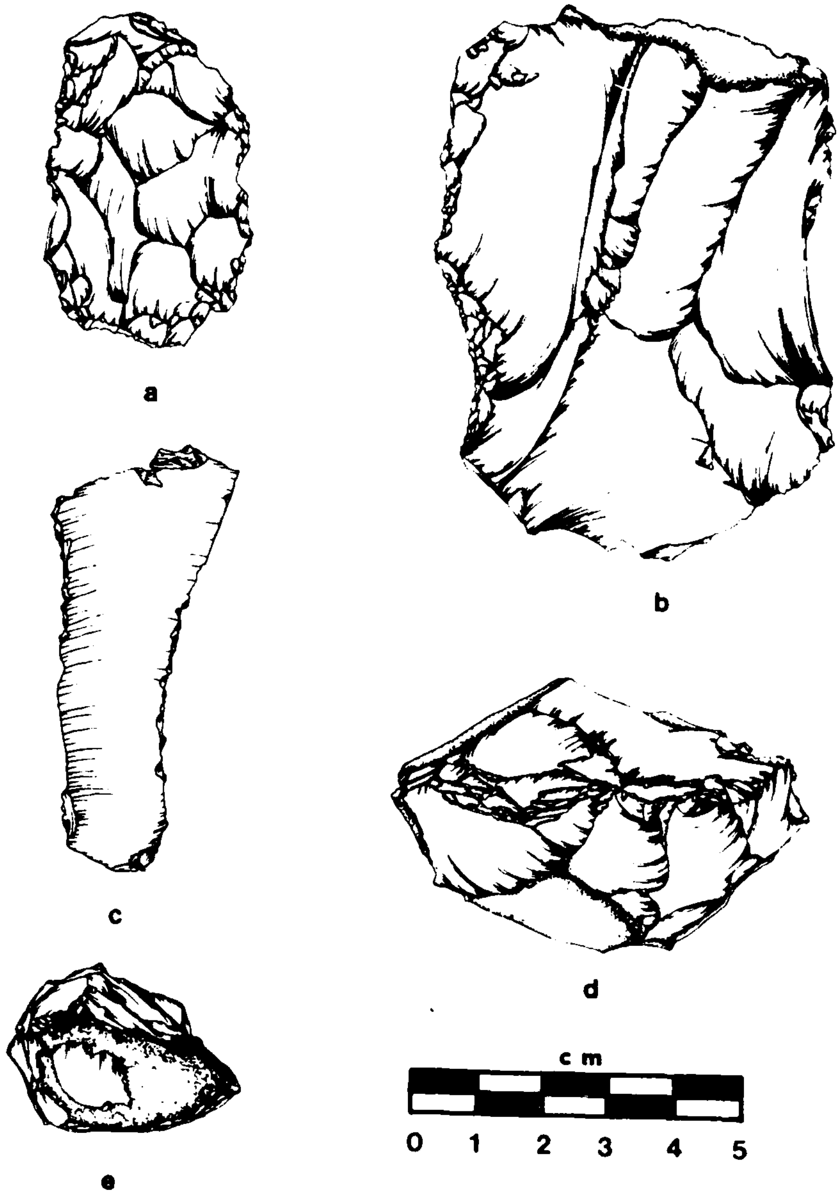


Figure 5.20 Composite tools, core, utilized flake and chert hammerstone from 23JA85: a. composite, notch-chopper (A0233377) b. composite, notch-chopper (A0238177) c. utilized flake (A0197177) d. core (A0406577) e. chert hammerstone fragment (A0413777).

Category 450: Cores (N = 1) (Fig. 5.20 (d)).

This core has a well-defined striking platform and four fake scars on one face. This is classified as a block core. It is of Winterset chert and measures 62 mm in length, 38 mm in width, 33 mm in thickness and weighs 85 g.

Category 500: End Scrapers (N = 2) (Fig. 5.21 (a)).

These two end scrapers are a marginally modified chip and a flake with continuous retouch. Both are complete and are made of Winterset chert.

Category 520: Disto-lateral Scrapers (N = 4) (Fig. 5.21: (a), (b), (c)).

The disto-lateral scrapers are marginally modified, continuously retouched flakes and chips. All are complete tools. Three scrapers are made from flakes and one is a chip. Three scrapers are of Winterset chert, one is Westerville chert.

Category 600: Perforator (N = 1) (Fig. 5.21 (e)).

This perforator is an invasively modified, indeterminate blank. It is made of Winterset chert.

Category 610: Gravers (N = 7) (Fig. 5.21 (f)).

The gravers are made on five marginally modified flakes and two chips. One flake graver has discontinuous retouch, six have continuous retouch. They are all made of Winterset chert.

Category 700: Notches (N = 14).

Notches are made on three marginally retouched chips, 10 flakes and one unidentifiable blank. Three flake notches have discontinuous retouch, all others have continuous retouch. The notches are made of Winterset chert, except one which is Westerville chert.

Category 710: Denticulates (N = 14) (Fig. 5.21: (g), (h)).

Denticulates are made on four marginally retouched chips and 10 flakes. Two chips and flakes have discontinuous retouch, the others have continuous retouch. One denticulate is made of Westerville chert, the others are of Winterset chert.

Category 800: Micro Duty Preforms and Knives (N = 11) (Fig. 5.21: (j), (k)).

The micro duty preforms and knives can be divided into marginally and invasively retouched forms. The marginally retouched forms are: one chip, two flakes and one indeterminate blank with continuous retouch. The seven invasively retouched forms are: two chips and five indeterminate blanks. All of these tools are made of Winterset chert.

Five of these are triangular tips of larger tools. These may be the remains of projectile points. Two midfragments and one base may also have belonged to projectile points. The three complete tools are ovate to rectangular in form with convex sides.

Category 810: Micro, Unnotched Projectile Points (N = 3) (Fig. 5.22: (c), (h), (j)).

Of these, one is made on a marginally retouched chip with continuous modification. A second is made on an invasively modified flake and the

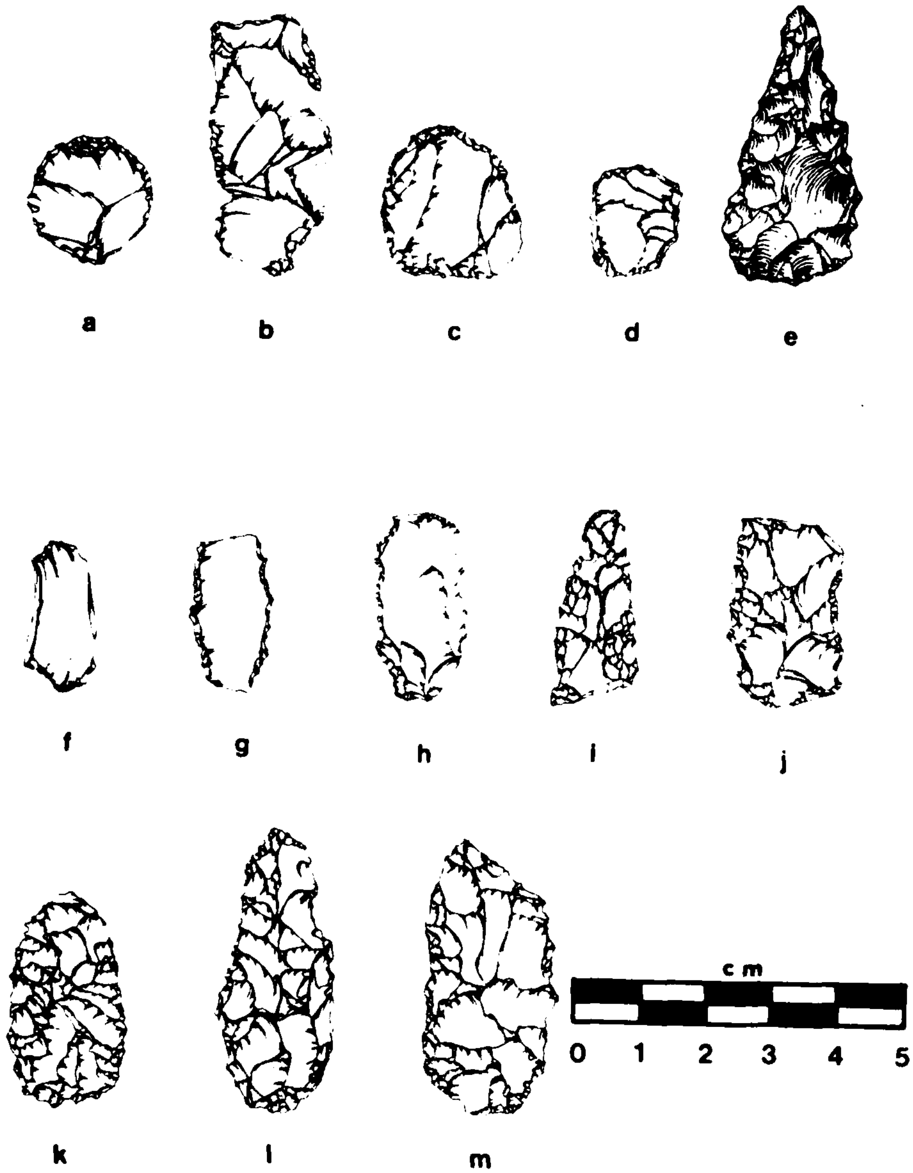


Figure 5.21 End scraper, disto-lateral scraper, perforator, graver, denticualtes, micro duty preforms and light duty preforms and knives from 23JA85: a. end scraper (A0381477) b. disto-lateral scraper (A0182777) c. disto-lateral scraper (A0277377) d. disto-lateral scraper (A0204177-2) e. perforator (A0500077) f. graver (A0202977-3) g. denticulate (A0204077-2) h. denticulate (A0204077-1) i. micro duty preform (A0253077) j. micro duty preform (A0270177) k. micro duty preform (A0332277) l. light duty preform or knife (A0325277) m. light duty preform or knife (A0247777).

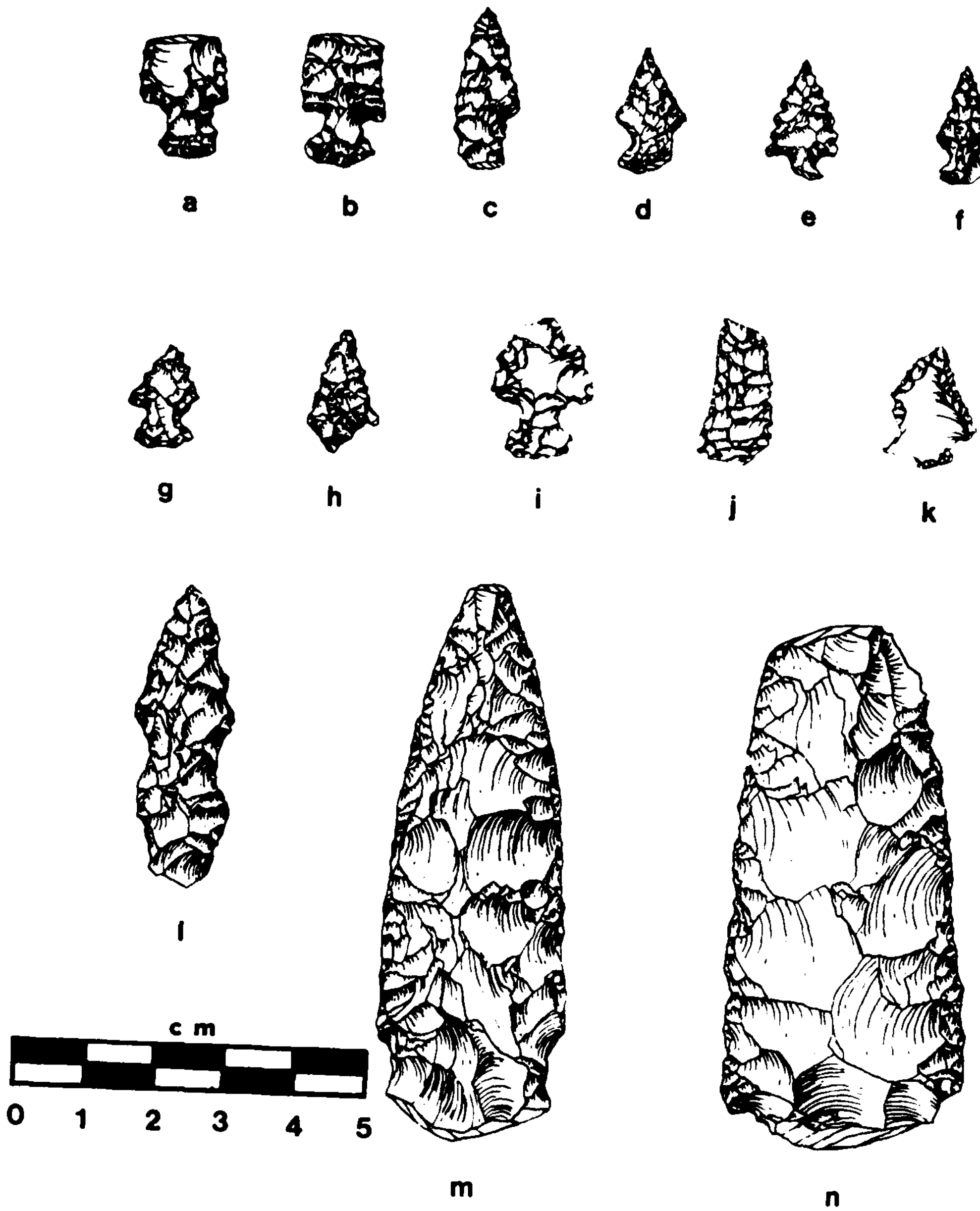


Figure 5.22 Projectile points from 23JA85: a. A0238877 b. A0232077 c. A0377077 d. A0256177 e. A0412077 f. A0377177 g. A0187077 h. A0412677 i. A0235077 j. A0179877 k. A0232577 l. A0162877 m. A0284177 n. A0224777.

third is an invasively modified, indeterminate blank. Two projectiles are made of Sinterset chert and one is Westerville chert.

Category 820: Micro, Notched Projectile Points (N = 11) (Fig. 5.22).

Four projectiles are made on marginally retouched chips with continuous modification. The others are invasively retouched chips (3) and indeterminate blanks (4). Eight of these projectiles are made of Winterset chert, two are Westerville, and one is of a non local chert. Cf the above projectile points, six are complete, four are bases and one is a midfragment. No two projectiles are of the same style. Many projectiles are asymmetrical. Corner notching appears on nine projectiles and contracting stems occur on two. These projectiles fit the description of Late Woodland points (Perino 1971:100).

Category 860: Light Duty Preforms and Knives (N = 12) (Figs. 5.21: (l), (m), (n); 5.22: (a)).

These tools are all made on invasively retouched, indeterminate blanks. Of these, ten are made of Winterset chert, one is Westerville and one is Burlington. Only three tools are complete. Their form varies from ovate to triangular with straight to convex edges.

Category 880: Light Duty Projectile Points (N = 3) (Fig. 5.22: (l), (m), (n)).

These projectiles are made on invasively retouched, indeterminate blanks. The complete projectile (A0162877, Fig. 5.22: (l)), appears to have been reworked. It has wide, shallow side notches on a thick, triangular blank. The blade is slightly serrated and convex. The stem is slightly narrower than the shoulders. This projectile, which is made of Winterset chert, conforms to the type called 'Schugtown' (Perino 1971:90). This projectile measures 42 mm in length, 15 mm in width, 7 mm in thickness and weighs 5 g.

A second projectile (A0224777, Fig. 5.22 (n)), has a large blade with straight to slightly convex sides. The tip and base are missing. The remaining portions of the base and shoulders suggest it was a corner notched point. This projectile is made of Winterset chert and measures 74 mm in length, 35 mm in width, 9 mm in thickness and weighs 27 g.

The third projectile (A0284177, Fig. 5.22 (m)), is a large, triangular, stemmed point. The blade edges are convex with well developed shoulders. The tip and base are missing. The fracture along the base has been modified to form an end scraper with a convex working edge. This tool is made of heated Westerville chert and measures 79 mm in length, 28 mm in width, 10 mm in thickness and weighs 22 g.

Category 900: Heavy Duty Preforms (N = 7) (Fig. 5.23: (b)).

Five tools are invasively retouched blanks, two of which are tabular and three indeterminate. The others are a flake and an indeterminate blank with marginal, continuous retouch. These tools are ovate to rectangular in form with convex working edges. Five tools are made of Winterset chert, two are of Westerville chert.

Category 950: Composite Tools (N = 15) (Fig. 5.20: (a), (b)).

These marginally retouched tools can be divided into five flakes with discontinuous retouch and nine flakes and one chip with continuous retouch. The tool forms represented in the composites are: graver-retouched flake (6), notch-retouched flake (6), notch-graver (1), notch-

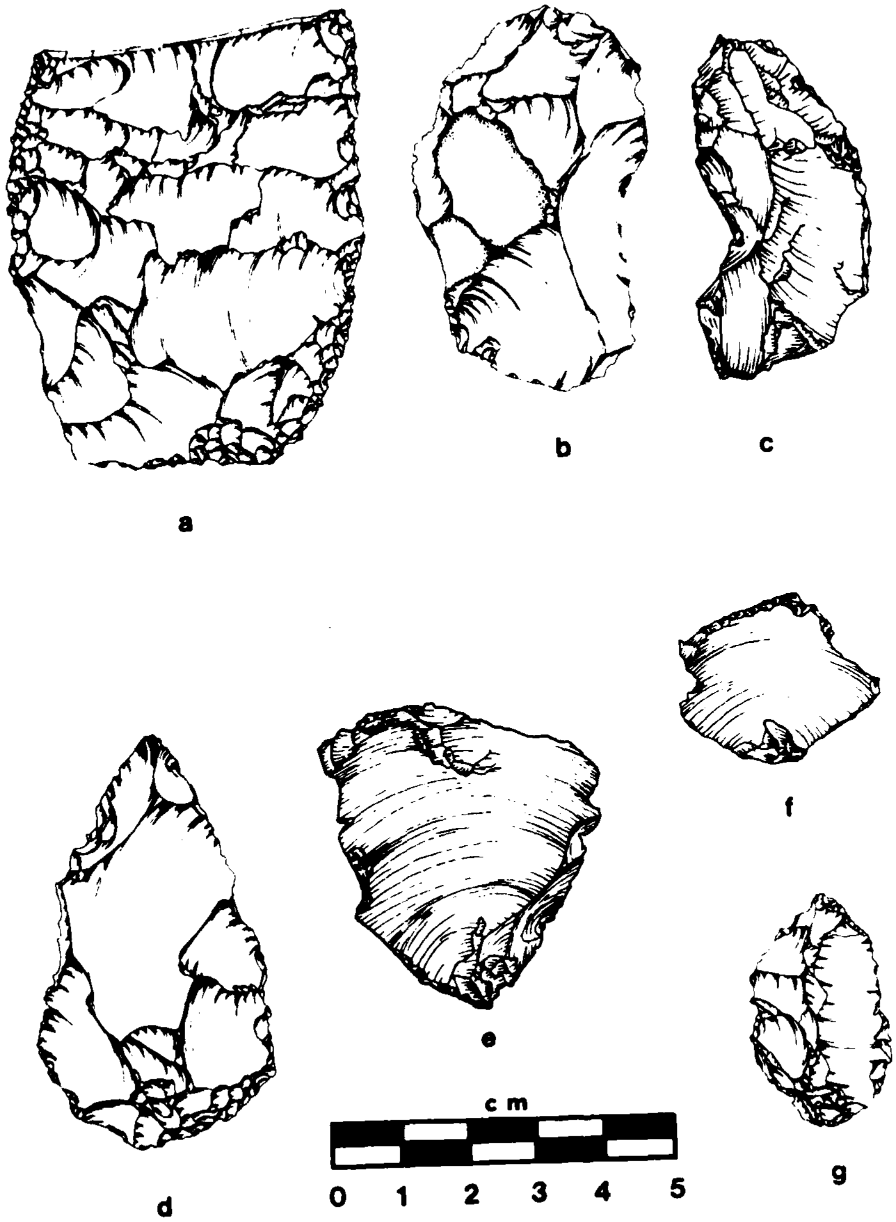


Figure 5.23 Light duty preform or knife, heavy duty preform and retouched flakes from 23JA85: a. light duty preform or knife (A0353777) b. heavy duty preform (A0196877) c. retouched flakes (A0171977) d. A0414477 e. A0221777 f. A0284677 g. A0207177.

Table 5.2

Frequencies of Tool Types
Marginally Modified

tool code	frequency	number incomplete
110	29	9
210	21	1
320	54	13
450	1	-
500	2	-
520	4	-
610	7	1
700	14	3
710	14	4
800	4	2
810	1	-
820	4	1
900	2	-
950	15	1
	Invasively Modified	
710	1	-
800	7	6
810	2	-
820	7	4
860	12	9
880	3	2
900	5	1

Table 5.3

Frequencies of Marginally Modified Tools

Discontinuous Retouch tool code	quantity	Continuous Retouch tool code	quantity
110	4	110	25
210	3	210	18
320	21	320	33
610	1 flake	500	1 flake
700	2 flakes		1 chip
710	2 chips	520	1 chip
	2 flakes		3 flakes
950	5 flakes	610	4 flakes
			2 chips
		700	7 flakes
			3 chips
			1 indeter.
		710	8 flakes
			2 chips
		800	1 chip
			2 flakes
			1 indeter.
		810	1 chip
		820	4 chips
		900	1 flake
			1 indeter.
		950	1 chip
			9 flakes

Frequencies of Invasively Modified Tools

tool code	quantity (Micro)	tool code	quantity (Light)	tool code	quantity (Heavy)
800	5 indeter.	860	12 indeter.	900	3 indeter.
	2 chips	880	3 indeter.		2 tabular
810	1 flake				
	1 indeter.				
820	4 indeter.				
	3 chips				

Table 5.4

Measurements of Complete Tools

tool code	quantity	Length	Width	Thickness	Weight	Edge Angle	
110	20	13.8	15.5	4.3	1.1	67.3	mean
		4.3	4.4	2.1	.3	13.2	St.d.
210	20	37.6	25.5	12.6	14.0	71.1	mean
		12.9	11.3	5.6	15.3	10.3	St.d.
320	41	30.6	24.7	6.6	4.4	58.8	mean
		6.7	9.5	3.2	3.5	12.4	St.d.
450	1	62.0	38.0	33.0	85.0	-	-
500	2	20.5	24.0	3.5	2.0	62.5	mean
520	4	26.8	17.5	4.8	2.5	68.8	mean
610	6	37.8	24.3	9.7	11.2	70.8	mean
700	11	29.5	25.7	8.1	6.0	65.0	mean
		9.4	8.0	4.7	5.5	8.4	St.d.
710	11	32.2	27.1	7.7	7.5	62.7	mean
		11.1	13.1	4.5	7.6	8.8	St.d.
800	3	25.3	15.7	4.0	2.0	41.7	mean
810	3	20.7	11.0	3.0	1.0	46.7	mean
820	6	17.0	10.8	2.5	1.0	41.7	mean
860	3	42.0	19.7	8.0	6.0	53.3	mean
880	1	42.0	15.0	7.0	5.0	55.0	-
900	6	54.2	33.5	18.7	41.5	62.5	mean
950	14	29.1	22.1	6.4	4.4	64.6	mean
		4.7	10.5	3.3	5.1	7.7	St.d.

retouched flake (1), and scraper-notch (1). These tools are made of Winterset chert except one, which is made of Westerville chert.

Functional Classification of Chipped Stone Tools

The following is a functional classification of modified, chipped stone tools from the Sperry site.

Marginally Modified Tools

Modified Chips (110): These light duty tools were apparently used in all cutting and scraping activities. The small size of these tools suggests they were hafted. These represent a generalized tool form (Tables 5.5 and 5.6).

Modified Shatter (210): These tools can be divided into two primary functions: (1) heavy duty shatter for use in cutting soft, medium hard and hard materials; and (2) light duty shatter which, in addition to being used for cutting, was also used in scraping hard materials (Table 5.6).

Modified Flakes (320): These light duty tools were apparently used in most all cutting and scraping activities. They represent a generalized tool form (Tables 5.5 and 5.6).

End Scrapers (500): These light duty tools were used in working soft, medium hard and hard materials. The steep edge angles would not encourage their use in cutting (Wilmsen 1970). Motor habits consisted of two directional motion while performing scraping tasks. The wear on the lateral edges may be the result of either use as side scrapers or hafting to a handle (Table 5.6).

Disto-lateral Scrapers (520): The steep edge angles on these light duty tools would not promote their use as cutting tools. The wear on three of these suggests their use in scraping soft and medium hard materials. The motor habits employed would be two directional (Table 5.6).

Gravers (610): These light and heavy duty tools were used in working medium hard and hard materials. The wear configuration suggests two different motor habits were employed; one directional and two directional (Tables 5.5 and 5.6).

Notches (700): These light and heavy duty tools were used in scraping medium hard and hard materials. The concave working edge is best suited to making round objects. Motor habits consisted of both one and two directional motion (Tables 5.5 and 5.6).

Denticulates (710): These tools were used in two separate activities, cutting and scraping. Those associated with scraping may have been used in shredding activities (Tables 5.5 and 5.6).

Micro Preforms and Knives (800): These tools either lack discernible wear or have rounding and represent unfinished tools and knives used to cut soft materials (Tables 5.5 and 5.6).

Micro, Unnotched Projectile Points (810): This single specimen was used to cut soft and medium hard materials. It was probably used to tip an arrow (Table 5.6).

Micro, Notched Projectile Points (820): One tool lacking discernible wear possibly represents an unfinished arrow point or one that was not used for a long period of time. A second specimen with lateral smoothing and crushing was probably used to tip an arrow (Tables 5.5 and 5.6).

Heavy Duty Preforms (900): These tools were used as choppers to cut medium hard and hard materials (Table 5.6).

Table 5.5

Incomplete Tools from 23JA85

	Tool Code	Tips						Midfragments						Bases				Indeter.
		NW	C SS	C S,MH	C MH,H	S S,MH	S MH,H	NW	C S,MH	C MH,H	S SS	S S,MH	S MH,H	NW	C SS	C S,MH	S MH,H	C S,MH
Invasively Modified	800	2L		2L					1L						1L			
	820							1L						3L				
	860	1L		1L	1L				1L						1L	4L		
	880									2L								
Marginal Modified	110				2L				1L	2L		1L	2L			1L		
	220								1L									
	320		2L	2L		2L						1L	2L		1L	1L	1L	1H
	610						1L											
	700					1L			1L				1L					
	710				1L					1L						1L		
	800	1L									1L							
	820													1L				
	950										1L							

Table 5.6

Complete Tools from 23JA85

			Lateral					Disto-Lateral				Distal			
	Tool Code	NW	C SS	C S,MH	C MH,H	S S,MH	S MH,H	C S,MH	C MH,H	S S,MH	S MH,H	C S,MH	C MH,H	S S,MH	S MH,H
Invasively Modified	710							1L							
	800	1L													
	810	1L						1L							
	820	2L							1L						
	860							3L							
	880				2L				1L						
	900							3H							
Marginally Modified	110				1L	1L	2L	1L				6L	3L	1L	5L
	210	1L		3H,3L	3L		3L	3H,1L				2H	1H		1L
	320	2L	1L	5L	5L	1H,4L	9L	5L	2L		1L		1L	3L	2L
	500							1L	1L						
	520							3L			1L				
	610								1H,1L	1H			1H	1L	1L
	700			1L	2H,1L		3L		1L						1H,2L
	710	1L			1L		3L	1L	2H,3L						
	800	2L													
	810							1L							
	820	1L		1L					1L						
	900								2H						
	950			1L	2L			1H,6L		2L	1L		1L		

Composite Tools (950): These light duty tools can be divided into the following combinations: graver-retouched flake (6), notch-retouched flake (6), notch-graver (1), notch-scraper (1), notched-retouched chip (1). These were used to cut and scrape soft and medium hard materials (Tables 5.5 and 5.6).

Invasively Modified Tools

Denticulates (710): This single specimen was used in cutting medium hard and hard materials (Table 5.6).

Micro Preforms and Knives (800): Three specimens are probably unfinished tools while three tips and midfragments belonged to tools used to cut medium hard and hard materials. One base with discernible rounding was probably a hafted tool (Tables 5.5 and 5.6).

Micro, Unnotched Projectile Points (810): One specimen with no discernible wear may be an unfinished tool or was not used for a prolonged period. A second specimen with discernible rounding and crushing was probably used to tip an arrow (Table 5.6).

Micro, Notched Projectile Points (820): Twelve specimens may be unfinished tools, some breaking during manufacture, or were not used for a duration sufficiently long to produce discernible wear. Seven complete tools were probably used to tip arrows. Ten bases with discernible wear suggest the hafting of the arrow points and subsequent breakage during use (Tables 5.5 and 5.6).

Light Duty Preforms and Knives (860): Only one specimen is probably an unfinished tool. Others were used to cut medium hard and hard materials.

Light Duty Projectile Points (880): One complete specimen was used to cut medium hard and hard materials. Two midfragments were also used to cut medium hard and hard materials. These tools were probably hafted and used as knives (Table 5.5 and 5.6).

Heavy Duty Preforms (900): These three tools were used to cut medium hard and hard materials (Table 5.6).

Summary of Chipped Stone Tools

The chipped stone tools recovered from the Late Woodland component represent the following activities: 1. production of a micro and light duty tool assemblage; 2. the production of arrow points to be used in faunal procurement and defensive tasks; 3. the probable disarticulation and processing of animal foods; 4. the working of hides and other soft materials; and 5. the chipping, cutting and sawing of wood and bone.

Non Chipped Stone Artifacts

Category 1000: Hammerstones (N = 2) (Figs. 5.20: (e); 5.24: (a), (b); 5.25: (b)).

One hammerstone is a fragment of Winterset chert with extensive battering on one end (Fig. 5.20: (e) A0413777). The one complete hammerstone of granite measures 67 mm in length, 58 mm in width, 40 mm in thickness and weighs 190 g.

Category 1020: Abraders (N = 2) (Fig. 5.24: (c-g)).

Two sandstone abraders with narrow grooves (3 mm in width) were recovered from feature 6. One consists of four cross-mended pieces and measures 95 mm in length, 62 mm in width, 30 mm in thickness and weighs 248 g. The second is complete and measures 75 mm in length, 56 mm in width, 28 mm in thickness and weighs 102 g.

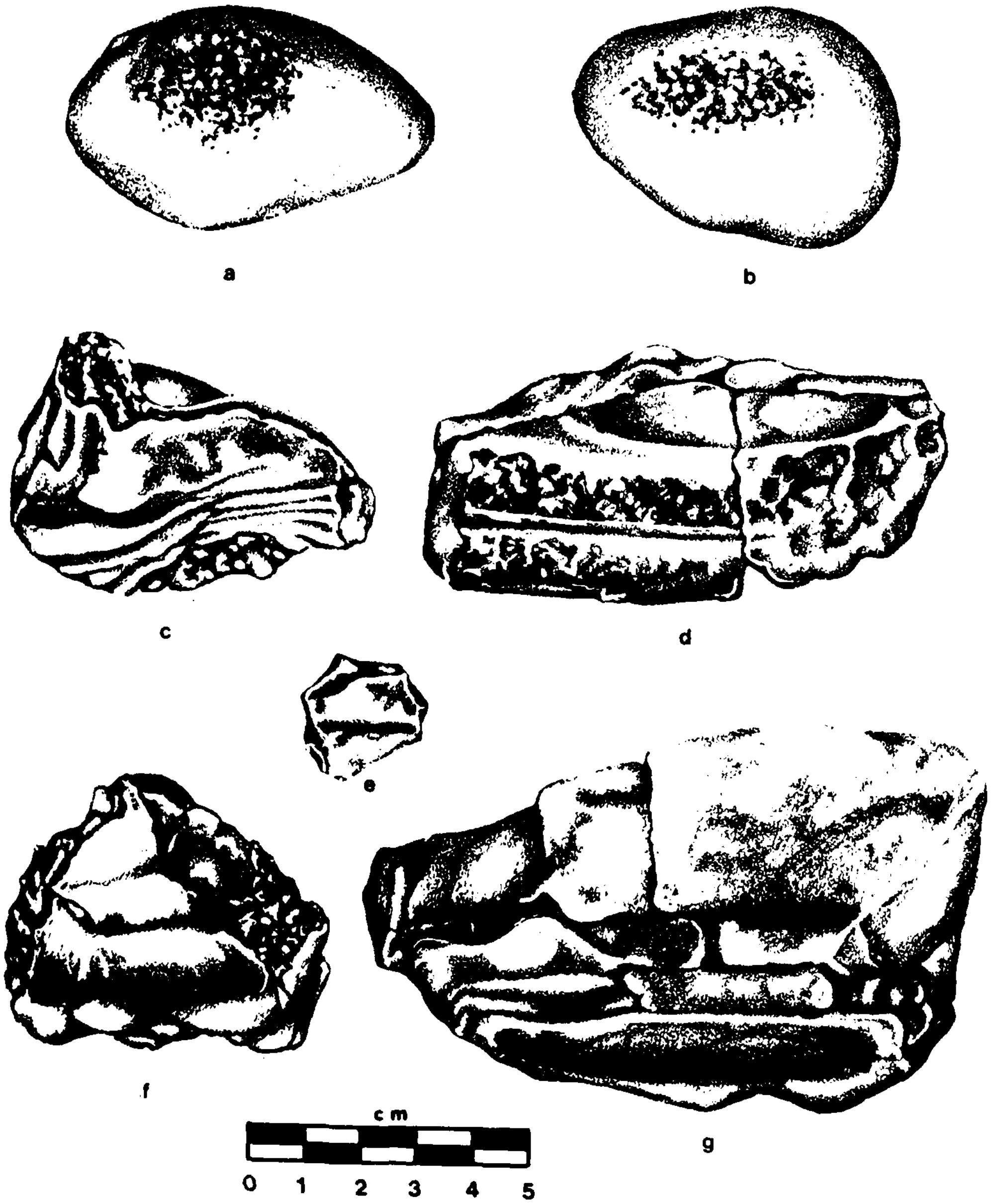
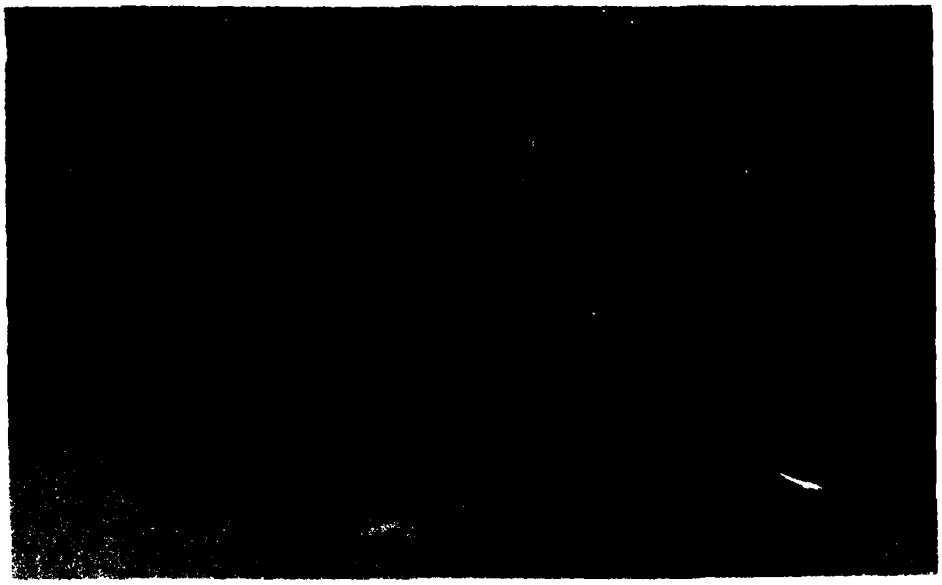


Figure 5.24 Hammerstone, sandstone abraders and metate fragments from 23JA85: (a) hammerstone (A0223477) (b) A0223477 (c) sandstone abraders (A0409377) (d) A0410077 and A0408177 (e) A0410677 (f) A0510077 (g) metate fragments (A0410277) (A0410277) and (A0411077).



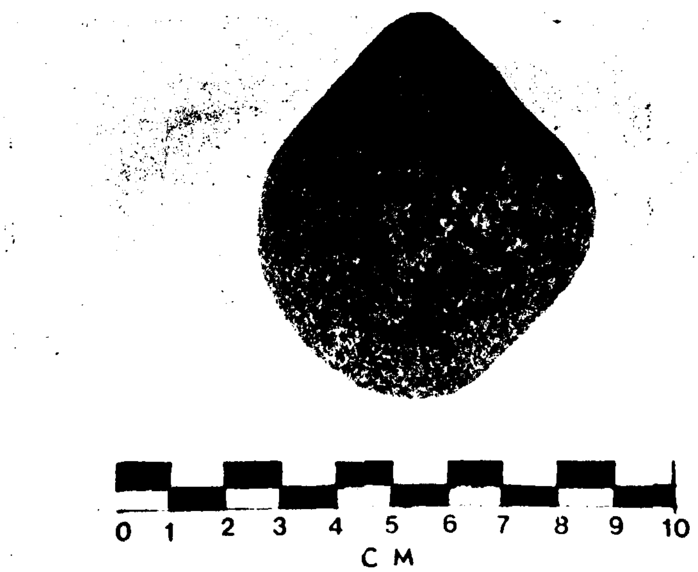


Figure 5.25 Metate and hammerstone from 23JA85: (a) metate (A0407177) (b) hammerstone (A0223477).

Category 1030: Hematite and Limonite (N = 23)

Of these, only one (A0413477) has evidence of smoothing. It has striations on one face and a smoothed corner. It measures 68 mm in length, 58 mm in width, 19 mm in thickness and weighs 100 g.

Category 1040: Metates (N = 2) (Figs. 5.25 and 5.26)

At least two metates were recovered from feature 6. One sandstone metate (A0407177, Fig. 5.26), was in situ. It measures 355 mm in length, 61 mm in width, 83 mm in thickness and weighs 4937 g. This metate has a shallow trough in one face which covers an area of 218 square centimeters. There are a number of small grooves across the top of the sandstone. These may be plow scars or the result of grinding hard objects such as granite and pottery to be subsequently used in tempering pottery. Grinding motion was back-and-forth.

The second metate is incomplete. It was reconstructed from 11 pieces of sandstone from feature 6. There are 10 additional sandstone fragments from feature 6 which have ground surfaces. These undoubtedly represent pieces of the second metate or are parts of a third (Fig. 5.24: (g)).

Category 1060: Nutting Stone (N = 1).

A sandstone, nutting stone was recovered from near feature 1. This tool has a single, shallow, circular depression which measures 24 mm in diameter. The stone measures 85 mm in length, 62 mm in width, 21 mm in thickness and weighs 139 g.

Category 1070: Limestone (N = 1153).

Much of the limestone appears to have been subjected to intense heat. The sample is divided into unburned and burned limestone. The limestone was weighed and the maximum dimension measured to the nearest mm. The unburned and burned limestone have samples of 150 and 1003, respectively. The descriptive statistics for the two samples are:

average length	23.7 mm, St. d. 24.0 (unburned)
	24.1 mm, St. d. 17.4 (burned)
average weight	20.5 g., St. d. 80.9 (unburned)
	15.5 g., St. d. 49.2 (burned)

Category 1080: Unworked Stone (N = 1079).

The unworked stone is composed of 864 unburned sandstone, 153 burned sandstone and 52 fragments of granite. Descriptive statistics for these unworked stones are:

Unburned Sandstone	Burned Sandstone	Granite	
16.2 mm	18.3 mm	16.4 mm	average length
11.4	16.3	12.1	St. d.

The small size and burned condition of these stones suggests they may also be hearth cleaning debris. The granitic stones were probably being crushed to be used to temper pottery (pottery will be discussed later).

Category 1090: Burned Earth (N = 2715)

Of these, only six are daub and one is a charred mud-daubers nest. The six daub fragments have stick and grass impressions. Of these, two have smoothed surfaces and rounded edges. None of the grass impressions had discernible, distinguishing characteristics as to genera (Dr. Ronald

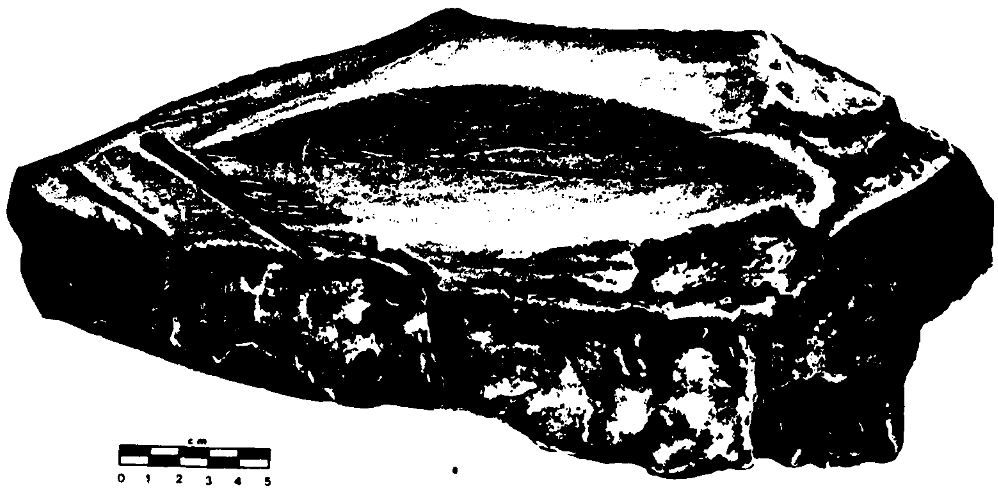


Figure 5.26 Metate recovered from 23JA85: (a) A0407177.

McGregor, University of Kansas Herbarium). The daub was recovered from the vicinity of feature 1 and may actually be hearth cleaning debris.

The charred mud-daubers wasp nest was recovered from the west excavation at 299.15 meters east and 481.94 meters north. It measures 39 mm in length, 27 mm in width and thickness. There are three cells present. The wasps belong to one of two species, Sceliphron caementarium L. or Chalybion caeruleum L. Near St. Louis, Missouri, which is near the same latitude as Kansas City, Sceliphron are active in mid- to late May. Chalybion have two generations, a winter and a summer. The winter generation is active from May 15 to July 15 and the summer generation from July 15 to October 15. It is not possible to determine season of human occupation on a site on the basis of the open or closed cells in the nests, since open and closed cells may be present the year round. The presence of nests does not indicate site habitation, but only that structures were present to afford protection for the wasps. However, "should a structure or feature be constructed after the Middle of October and destroyed or filled before the middle of the following May, no nests would be expected in the archaeological record as the wasps are not active from mid-October to mid-May" (Freimuth and LaBerge 1976:111-114).

Category 1100: Pottery (N = 616) (Figs. 5.27 to 5.29)

Due to the fragmentary nature of the sherds, only those complete enough to measure maximum sherd thickness were included in the analyses. There were 316 sherds complete enough to be sorted into the following groups: 1. plain (N = 260) and 2. cordmarked (N = 56). Initial analysis of the sherds consisted of descriptive statistics for the attributes. Descriptive statistics were obtained by use of the SPSS Library Program Subroutine Frequencies (Nie et al. 1975). Not all attributes were pertinent to both groups of pottery.

Eleven sherds from various tempering categories were chosen for petrographic analysis. Four sherds were chosen from those identified as being tempered with granite, and one sherd was chosen from each of the following categories: grit and sand; grit; sand and sherd; indurated clay; limestone; sand; and the absence of temper. The following observations were made on each sherd: 1. mineral composition of aplastics; 2. size range of aplastics; 3. density of aplastics; 4. shape of mineral particles; 5. presence or absence of sherd temper; 6. "fabric" in paste; 7. presence or absence of a slip or levigated surface; and 8. presence holes and/or tensional cracks. Table 5.7 shows the observations made during the analysis for each thin-section. The petrographic analysis was performed by Dr. Marion Bickford of the Geology Department at the University of Kansas (O'Malley 1978).

A discrepancy was notable between the preliminary and petrographic analyses in the identification of temper. All of the sherds contained small grains of quartz and feldspar, which are attributed to decomposed granite, within the paste. The mineral fragments varied in size from 3.5 mm to less than 0.02 mm in diameter. Most mineral particles were angular, although some rounded particles were discernible in the sherd identified as sand-tempered (O'Malley 1978).

A "fabric" was observed in the paste of a few sherds. These consisted of a directional orientation of clay particles and fine mineral fragments around a piece of sherd temper (Fig. 5.30). Holes and tensional cracks were present in a majority of the sherds (Fig. 5.31). These can be attributed to the presence of organic matter in the clay

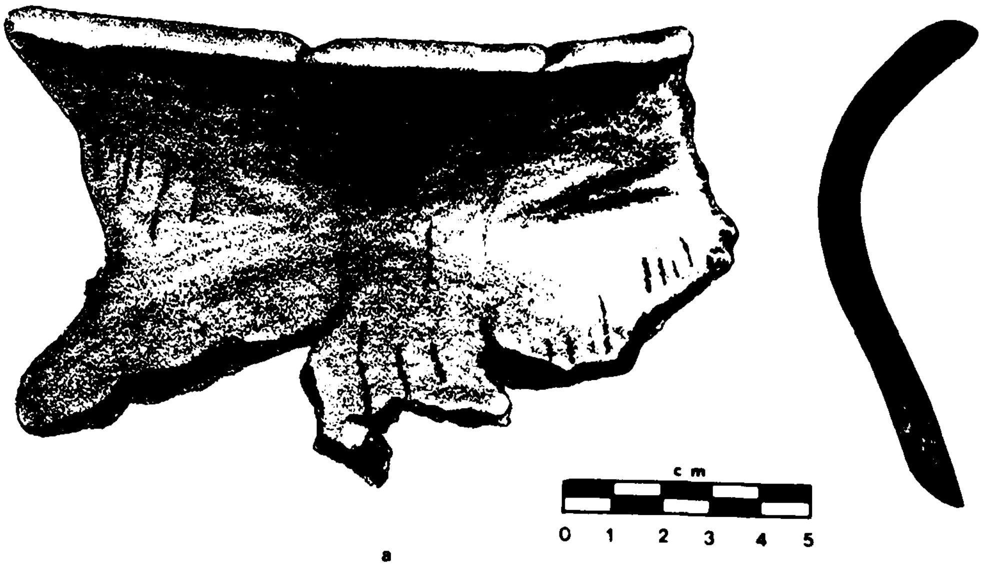


Figure 5.27 Rim sherd from 23JA85: (a) A0334977.

Figure 5.28 Pottery from 23JA85: (a) A0451977 (b) A0393977 (c) A0326277 (d) A0196977 (e) A0299177 and A0403377-1.

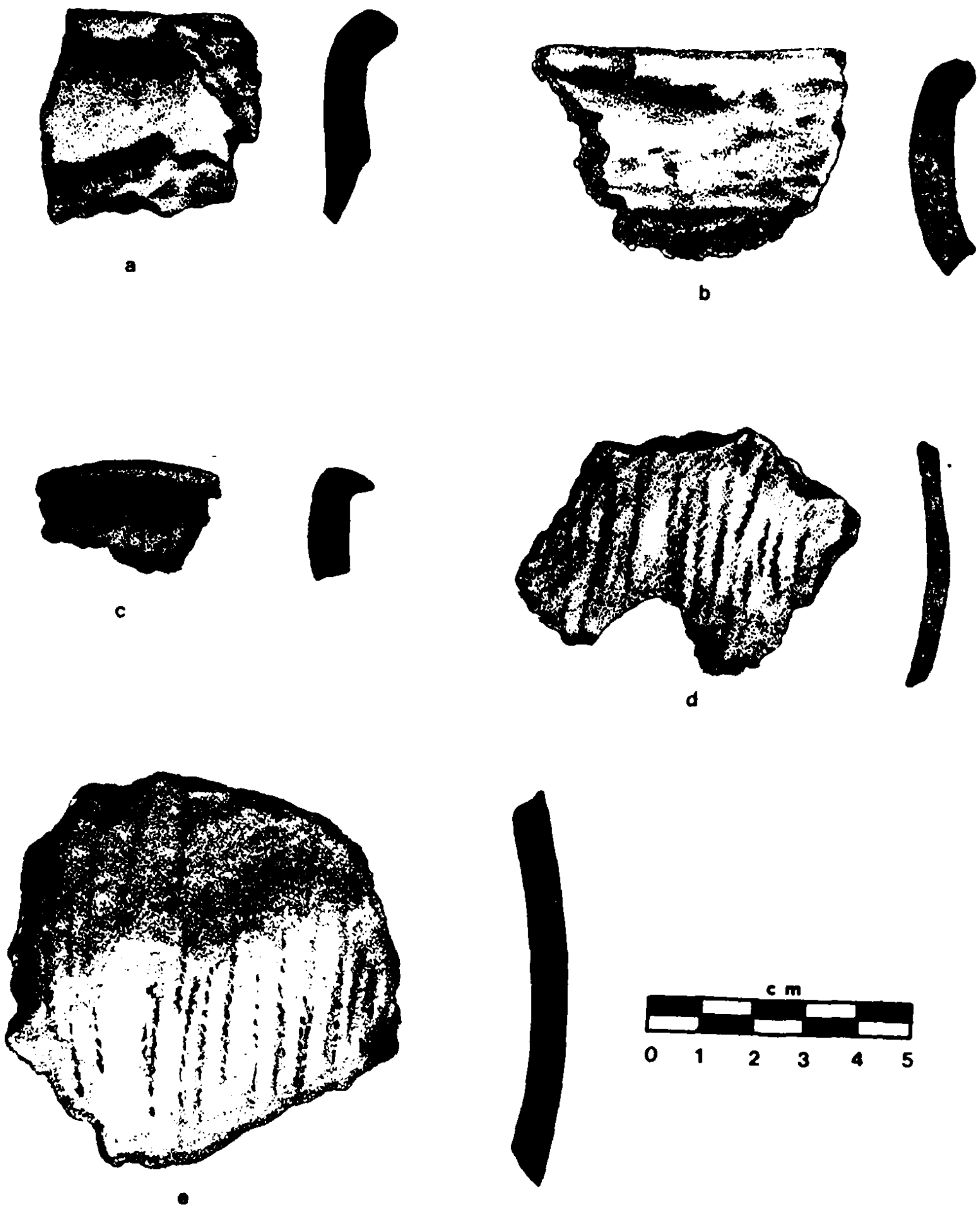


Figure 5.29 Pottery from 23JA85: (a) A0387177 (b) A0300977 (c) A0247077 (d) A0242777 (e) A0281077.

Table 5.7

Results of the Petrographic Analysis

No. of thin-section	Mineral Composition	Size Range of Temper	Temper Density	Shape of Particles	Presence of Old Sherds
A0246477	quartz; microclines; biotite; intergrown granitic particles	0.2-2 mm (large) .01 mm (small)	30% (larger grains-10%)	angular	yes (10%)
A0219277	quartz feldspar	.02 mm (average) no large grains	30%	angular	possible
A0403377-4	intergrown quartz, perthite, plagioclase feldspars, biotite	up to 3.0 mm (large) fine quartz and feldspar in clay body (.02 mm) no intermediate sizes	10% (large) 15-20% (fine)	angular	no obvious indications
A0414977	quartz K-feldspars plagioclase feldspars some intergrown	1.0 mm (average) up to 3.0 mm; fines average .02 mm no intermediate sizes	5% (large) 15-20% (fine)	angular	no obvious indications
A0400877-2	quartz; feldspar; one volcanic rock fragment; some intergrown fragments	0.02-0.5 mm (no large sizes)	35-45%	angular (larger particles are angular to subrounded	yes (10%)
A0326577	See A0400877-2 (also contained one fragment of schist)	See A0400877-2	25-35%	See A0400877-2	yes

(from O'Malley 1978)

Table 5.7 cont'd.

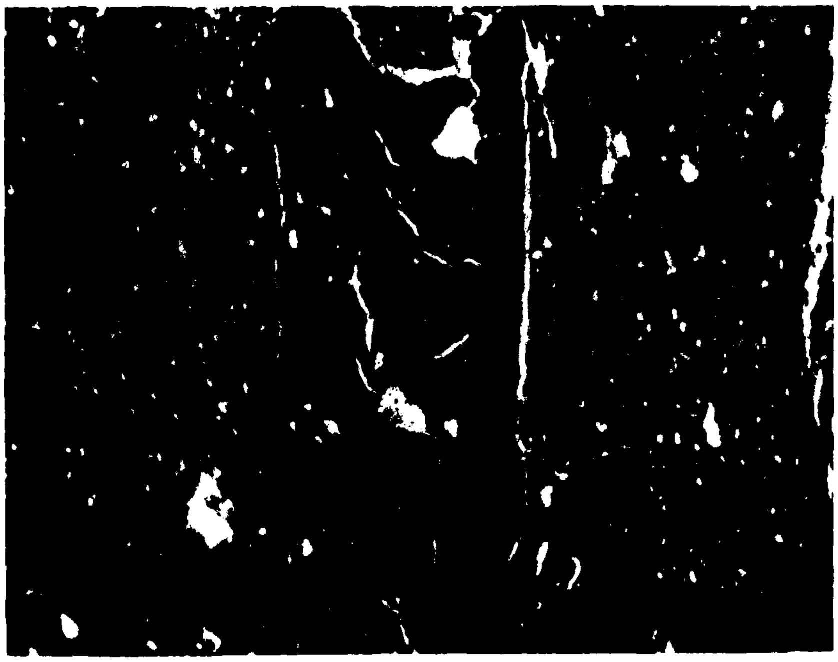
No. of thin-section	Mineral Composition	Size Range of Temper	Temper Density	Shape of Particles	Presence of Old Sherds
A0403377-2	quartz feldspar granitic detritus	1.0-3.5 mm (large) 0.02 mm (small)	15% (large) 25% (small)	angular	yes 5%
A0374577-1	quartz feldspar	0.02 mm	15-20%	angular	yes abundant
A0403377-1	quartz feldspar granitic detritus	1 mm (large) 0.02 mm (small)	1-2% (large) 25-30% (small)	angular	yes abundant
A0296377	quartz feldspar granitic detritus	1.5 mm (large) 0.02 mm (small)	3-5% (large) 20% (small)	angular	yes (10%)
A0407377	quartz feldspar biotite	1.0 mm (large) 0.02 mm (small)	3-5% (large) 20-25% (small)	angular	yes (5-10%)

Table 5.7 cont'd.

No. of thin-section	Fabric	Slip/ levigated surface	Holes and cracks	Comments
A0246477	minor-elongate holes and cracks parallel to surface	yes	5% holes	Sherds as temper occur in sizes up to 2.0 mm in diameter; virtually complete firing. Originally identified as sand tempered; possible slip on smoother surface (lighter in color).
A0219277	no	yes	20-30% holes; cracks parallel to surface	Possible slip on both sides (lighter in color); leached holes thought to have once contained fragments of limestone.
A0403377-4	no	no	no holes cracks common	Appears crudely made; underfired/ identified originally as granite temper.
A0414977	no	no	tensional cracks about 5% of area; no holes	Almost completely fired; originally identified as granite tempered.
A0400877-2	yes	yes	A few holes and tensional cracks	Sherds as temper occur sizes up to 2.0 mm in diameter; virtually complete firing; originally identified as sand tempered.
A0326577	yes	no	both present	Very similar to A0400877-2; underfired; identified originally as sand and sherd.
A0403377-2	yes	yes	Few holes and tensional cracks	Sherds occur around 1.0 mm in diameter; underfired.

Table 5.7 cont'd.

No. of thin-section	Fabric	Slip/ levigated Surface	Holes and cracks	Comments
A0374577-1	yes	yes	A few cracks and holes present	Larger granitic and mineral fragments present in sherd temper which is abundant and obvious; virtually complete firing; Originally identified as indurated clay.
A0403377-1	yes	yes	present	Sherd temper particles are up to 2 mm in diameter; Well fired; originally identified as absent temper.
A0296377	yes	yes	present	Sherd temper particles are around 2.0 mm in diameter; levigated or slipped surfaces very distinct; concave-1.0 mm; convex-0.25 mm thick; originally identified as granite.
A0407377	yes	no	present	Sherd temper is less than or equal to 3.0 mm in diameter; incomplete firing; originally identified as grit and sand tempered.



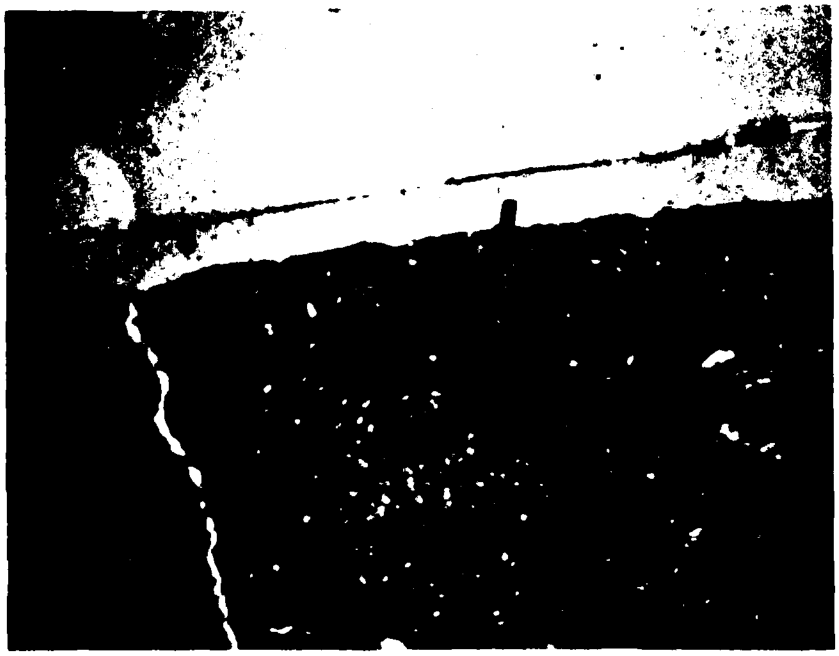


Figure 5.30 Photographs of thin-sections of sherd tempered pottery from 23JA85: (a) thin section showing a straight edge which represents a relict sherd surface (A0246477), (b) sherd temper with "fabric" around it (A0403377-1) (magnification is 28X).

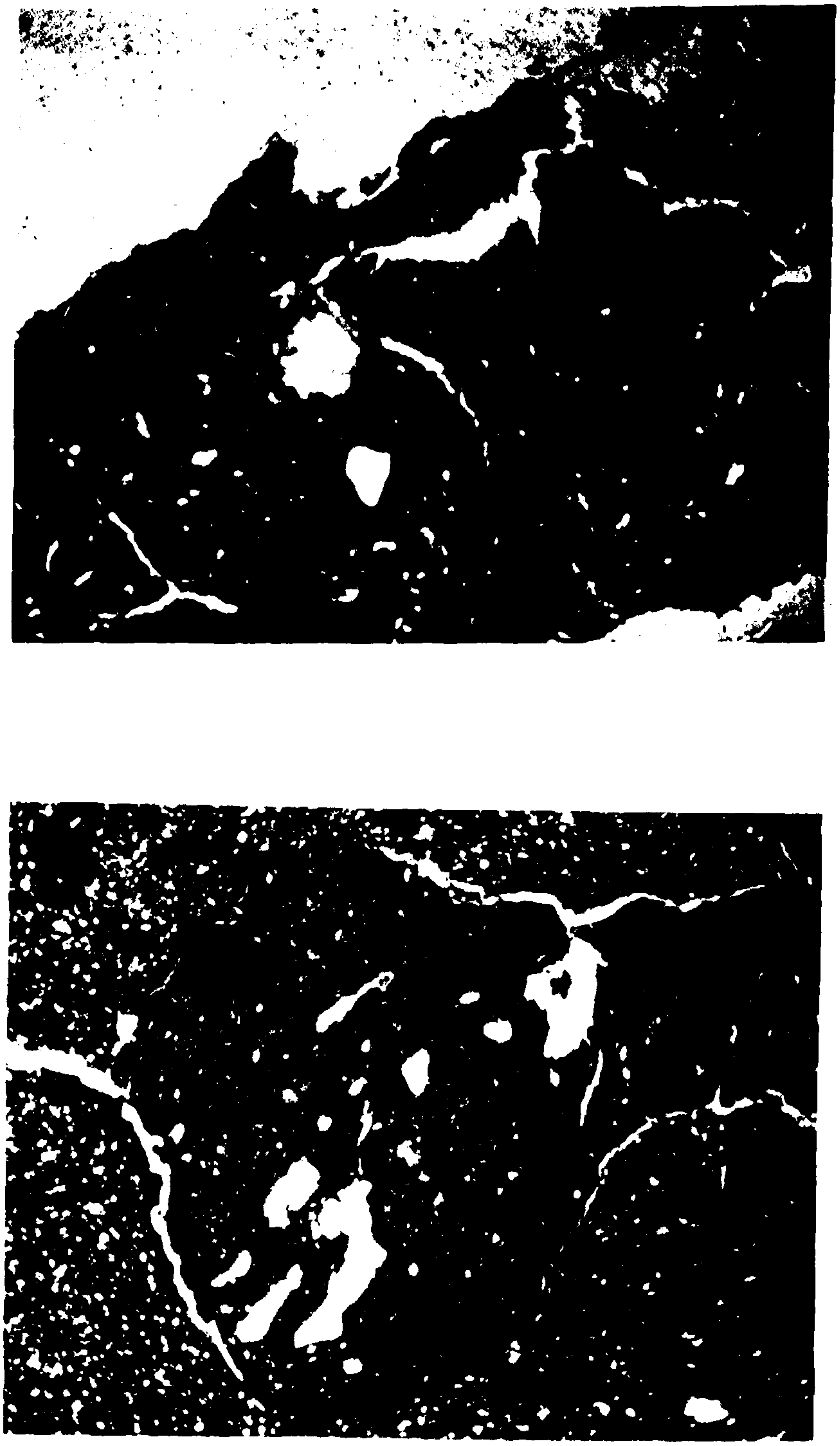


Figure 5.31 Photographs of thin-sections of sherd tempered pottery from 23JA85: (a) thin section showing cracks and holes around sherd temper (A0219277), (b) thin section showing levigation or slipped surface (A0296377) (magnification is 28X).

which burned away during firing and the possible leaching out of limestone temper (O'Malley 1978).

Results of the petrographic analysis indicate that most sherds were tempered with other materials in addition to granite, most notably sherds. Sherd temper was rarely discernible with the use of a binocular microscope (7X to 30X) due to the difficulty in distinguishing between the matrix of the sherd temper from the paste. The presence of large granite particles both in the paste and in the sherd temper tended to obscure the presence of the sherd tempering particles. Despite the variability in the sample, all of the sherds appear to have been locally made (O'Malley 1978).

Tables 5.8 to 5.11 present the frequencies of attributes for 260 plain and 56 cordmarked sherds. There are 19 plain rim sherds and three cordmarked rim sherds. The tables allow comparisons to be made between the plain and cordmarked sherds.

<u>Temper</u> (Table 5.8)

Examination of temper with the aid of a binocular microscope, 7X to 30X, resulted in identifying crushed granite and sand to account for the largest percentage of tempering materials. Petrographic analysis of 11 sherds indicated a high frequency of sherd tempering. It is believed that the present identifications are accurate with the exception of sherd tempering, which is under-recorded.

<u>Temper Size and Quantity</u> (Table 5.8)

Temper size is predominately less than two mm and in quantities of less than or equal to 20%.

<u>Natural Paste Inclusions</u> (Table 5.8)

Particles of hematite are the dominate natural paste inclusion. It occurs in 88% to 91% of the sample.

<u>Exterior Paste Color</u> (Table 5.8)

Exterior paste colors tend to be about 7.5YR4/0 to 7.5YR3/0 and 10YR4/1.

<u>Interior Paste Colors</u> (Table 5.9)

Interior paste colors tend to be 10YR4/1 to 10YR3/1 and 7.5YR3/0.

<u>Core Colors</u> (Table 5.9)

Core colors tend to be 10YR4/1 to 10YR3/1.

<u>Slip Colors</u> (Table 5.9)

Slip colors tend to be about 10YR4/1 or 7.5YR3/0.

<u>Carbon Streak</u> (Table 5.9)

Carbon streaks are present in approximately 66% to 68% of all sherds.

<u>Randformen-Kombinationstabelle Number</u> (Table 5.10)

Of the 19 rim sherds with plain exteriors, three have discernible slips. Two sherds with slips are from feature 2. They appear to be from the same vessel. The lip thicknesses measure from 5 to 6 mm, rim thickness from 8 to 10 mm, rim height 20mm, shoulder thickness from 9 to 11 mm and rim diameters from 20 to 22 cm. The rim forms conform to Randformen-

Table 5.8

Descriptive Statistics of Pottery Attributes

	Plain Sherds		Cordmarked Sherds	
Temper Type				
N = 260			N = 56	
absent	12	4.6	3	5.4
sand	43	16.5	18	32.1
sherd	17	6.5	3	5.4
limestone	2	.8	1	1.8
crushed granite	184	70.8	29	51.8
sand and sherd	2	.8		
grit and sand			2	3.6
Temper Size and Quantity				
N = 260			N = 56	
x LT 1 (10%)	139	53.5	29	51.8
x LT 1 (20%)	1	.4	4	7.1
1 LT x LT 2 (10%)	68	26.4	13	23.2
1 LT x LT 2 (20%)	14	5.4	7	12.5
2 LT x LT 3.3 (10%)	15	5.8		
2 LT x LT 3.3 (20%)	4	1.5		
3.3 LT x LE 4 (10%)	13	5.0	1	1.8
3.3 LT x LE 4 (20%)	6	2.3	1	1.8
x LT 1 (30%)			1	1.8
Natural Paste Inclusions				
N = 260			N = 56	
absent	29	11.2	5	8.9
hematite	231	88.8	51	91.1
Exterior Paste Color				
N = 260			N = 56	
10 YR 2/1	1	.4		
10 YR 3/1	14	5.4	10	17.9
10 YR 4/1	93	35.8	27	48.2
10 YR 6/3	1	.4		
10 YR 7/4	23	8.8	1	1.8
10 YR 8/6	5	1.9	1	1.8
7.5 YR 3/0	53	20.4	10	17.9
7.5 YR 3/1			10	17.9
7.5 YR 4/0	69	26.5	7	12.5
7.5 YR 6/4	1	.4		

Table 5.8 cont'd.

Plain Sherds			Cordmarked Sherds	
Interior Paste Color				
N = 260			N = 56	
10 YR 2/1	6	2.3	7	12.5
10 YR 3/1	67	25.8	9	16.1
10 YR 4/1	79	30.4	14	25.0
10 YR 5/2	1	.4	2	3.6
10 YR 6/3	17	6.5	2	3.6
10 YR 7/4	1	.4	2	3.6
10 YR 8/6	1	.4		
7.5 YR 3/0	63	24.2	16	28.6
7.5 YR 4/0	23	8.8	4	7.1
7.5 YR 6/4	1	.4		
7.5 YR 7/4	1	.4		
Core Color				
N = 260			N = 56	
10 YR 2/1	20	7.7	3	5.4
10 YR 3/1	133	51.2	32	57.1
10 YR 4/1	47	18.1	9	16.1
10 YR 5/2	4	1.5	2	3.6
10 YR 6/3	11	4.2	2	3.6
7.5 YR 2/0			1	1.8
7.5 YR 3/0	25	9.6	3	5.4
7.5 YR 4/0	13	5.0	2	3.6
7.5 YR 6/4	4	1.5	2	3.6
7.5 YR 7/4	3	1.2		
Carbon Streak				
N = 260			N = 56	
absent	84	32.3	19	33.9
present	176	67.7	37	66.1
Slip Color				
N = 260			N = 56	
10 YR 2/1			1	1.8
10 YR 3/1	4	1.5	1	1.8
10 YR 4/1	15	5.8	2	3.6
10 YR 7/4	1	.4		
7.5 YR 3/0	7	2.7	4	7.1
7.5 YR 4/0	1	.4		
absent	232	89.2	48	85.7

Table 5.8 cont'd.

Plain Sherds			Cordmarked Sherds	
		Randformen-Kombinationstab		
N = 19			N = 3	
Indeter.	4	20%		
1213	3	16%		
1240	2	11%	1	33.3%
1311	1	5%		
1313	2	11%		
2213	1	5%		
1340			2	66.7%
2313	2	11%		
2411	1	5%		
3313	2	11%		
4212	1	5%		
		Lip Thickness		
N = 19			N = 3	
mean	6.26		5.67	
median	8.50		6.00	
mode	5.00		5.00	
St.d.	1.82			
		Rim Thickness		
N = 18			N = 3	
mean	8.78		9.0	
median	10.00		9.0	
mode	8.00		9.0	
St.d.	2.16			
		Rim Height		
N = 14			N = 1	
mean	13.36		24.0	
median	13.50		24.0	
mode	5.00		24.0	
St.d.	6.01			
		Rim Diameter		
N = 12			N = 3	
mean	183.33		200.67	
median	180.00		200.50	
mode	190.00		210.00	
St.d.	30.25		10.53	

Table 5.8 cont'd.

Plain Sherds			Cordmarked Sherds	
		Shoulder Thickness		
N = 15			N = 3	
mean	8.33		9.33	
median	7.50		9.00	
mode	9.00		10.00	
St.d.	2.26			
		Body Thickness		
N = 260			N = 56	
mean	9.17		8.46	
median	8.00		9.00	
mode	8.50		8.20	
St.d.	2.35			
		Cord Diameter		
N = 0			N = 56	
		mean	1.65	
		median	1.60	
		mode	1.75	
		St.d.	.28	
		Cord Twist		
N = 0			N = 56	
		indeter.	13	23.2
		S	37	66.1
		Z	6	10.7
		Cord Spacing		
N = 0			N = 56	
		mean	3.27	
		median	2.85	
		mode	2.00	
		St.d.	1.61	
		Uniform Cord Spacing		
N = 0			N = 56	
		yes	37	66.1%
		no	19	33.9%

Kombinationstabelle Number 1213, a straight rim with a round lip. The third rim with a slip was too fragmentary to measure rim diameter and shoulder thickness. The lip thickness measures 5 mm and the rim thickness 8 mm. This is an excurvate rim with a slightly pinched lip.

The 16 sherds with floated or plain exteriors have from straight to excurvate rims. Many of these sherds were too fragmentary to take all of the rim measurements.

Three rim sherds have exterior cordmarking. One sherd has vertical cordmarks on the shoulder (Fig. 5.29 (b) A0300977). This sherd is granite tempered and has a lip thickness measuring 7 mm, rim 9 mm, shoulder 10 mm and rim diameter of 21 cm. It conforms to Randformen-Kombinationstabelle Number 1340, which is a straight rim.

Two cordmarked rim sherds have slips applied over the exterior cordmarking. The first, (A0334077), is granite tempered with vertical cordmarking on the shoulder and rim. Lip thickness measures 5 mm, rim thickness 8 mm, body thickness 8 mm, and rim diameter 19 cm. This rim sherd was assigned Randformen-Kombinationstabelle Number 1340. It is excurvate with an undecorated, round lip. The slip is darker than the exterior paste. The slip appears to have been applied with a brush.

The second cordmarked sherd with a slip, (A0364577), is tempered with grit and sand. The cordmarkings are vertical. The lip measures 5 mm in thickness, the rim 10 mm, the shoulder 10 mm, and the rim diameter was 22 cm. It was assigned Randformen-Kombinationstabelle Number 1240. This is a straight rim with a round lip.

Lip Thickness (Table 5.10)

Lip thickness is approximately 6 mm for most all rim sherds.

Rim Thickness (Table 5.10)

Rim thickness is about 9 mm for both plain and cordmarked rim sherds.

Rim Height (Table 5.10)

For most plain sherds, rim height is approximately 13 to 14 mm. The one cordmarked sherd didn't allow any generalizations to be made, except that it has a rim height of 24 mm.

Rim Diameter (Table 5.10)

Rim diameters are consistently about 18 to 20 cm. This suggests all vessels had similar size orifices.

Shoulder Thickness (Table 5.11)

Shoulder thickness tends to vary, however, 8 mm is about average.

Body Thickness (Table 5.11)

Body thickness tends to be slightly greater than shoulder thickness. The average is about 9 mm.

Cord Diameter (Table 5.11)

The 56 cordmarked sherds have nearly the same diameter cord impressions. Cord diameters average 1.7 mm.

Cord Twist (Table 5.11)

The most prominent cord twist is the S form, which occurs on 66% of the cordmarked sherds. The Z twist occurs on 10.7%. The direction of cord twist was not discernible on 23.2% of the sherds.

Cord Spacing (Table 5.11)

The spacing between the cord impressions is about 3 mm.

Uniform Cord Spacing (Table 5.11)

Uniform cord spacing occurs on 66% and irregular spacing on 34% of the cordmarked sherds.

The above statistics allow the following summary of characteristics of the Late Woodland pottery:

1. There are two styles of pottery based on variations in surface treatment, plain and cordmarked. Plain sherds comprise ,8% and cordmarked sherds 22% of the sample.
2. Carbon streaks are present in 67.4% of the sherds, suggesting a reducing atmosphere and/or short firing time (Shepard 1956:82).
3. Crushed granite and sherds are the most frequently occurring tempering materials. Use of a binocular microscope aided in identifying crushed granite in 67.4% of the sample.
4. Hematite particles occur in 85% of the sample as natural paste inclusions.
5. Paste colors are within the 10 YR and 7.5 YR range of soil colors in the Munsell soil color chart (1975 edition).
6. Core paste color is usually darker than exterior and interior paste colors.
7. Body thickness seems to approach an ideal of nine mm. This probably has a functional relationship with vessel size, form and function.
8. Temper size is usually less than two mm and occurs in quantities of less than 20%.

Category 1110: Faunal Remains

Table 5.9 lists the faunal remains recovered from excavations and Table 5.10 lists their preferred habitats. Relatively few bones were identifiable to species, genus or family due to their small size and fragmentary condition. Their small size can be attributed to natural agents which caused breakage of the bone. Several general observations can be made. First, the occurrence of rodents such as Symptomys cooperi, Geomys bursarius, and Tamias sp. are quite small and would not be worth the effort to procure for food. In addition, none of these bones are charred which suggests these animals postdate the Late Woodland component. If these rodents are associated with site occupation, they were probably attracted to food stored in underground pits.

The snakes, Family Colubridae, either Elaphe (rat snake) or Hampropeltis (King snake), and Pituophis (bull snake) were probably attracted to the site in response to more abundant food such as the rodents. None of the snake bones are charred which suggests they might postdate the Late Woodland occupation of the site.

The domestic chicken (Gallus gallus) bone can be attributed to later historic occupation of the general area.

The remaining animals which would be likely candidates for human food include two mammals (deer and cottontail), birds, fish and turtle. No specific identifications were possible for the fish, birds or turtle. The location of the site on the floodplain is ideal for the procurement of aquatic animals. The available evidence suggests the occupants of the site were not exploiting the uplands to any significant degree (O'Malley 1979: 61-66).

Table 5.9

Identifiable Faunal Remains Recovered from the Sperry Site

Genus	Common Name	Element	Right	Left	Indeter. Side
Odocoileus virginianus	White-tailed deer	naviculo cuboid	1	--	--
"	"	phallange, first row, distal	1	--	--
Sylvilagus floridanus	Cottontail	2nd, 3rd, 4th metatarsals	1	--	--
"	"	immature femur	1	--	--
Symptomys cooperi	Southern lemming mouse	mandibular corpus	--	1	--
"	"	mandibular incisor	--	1	--
"	"	mandibular molars	2	--	--
"	"	molar fragment	--	--	--
Geomys bursarius	Plains pocket gopher	calcaneus	1	--	--
"	"	upper incisors	1	1	--
"	"	hypsodont mandibular molar	1	--	--
Tamias sp.	Ground squirrel	maxillary molar	1	--	--
Gallus gallus	Domestic chicken	radius	1	--	--
Elaphe	Rat snake				
or					
Hampropeltis	King snake	vertebrae centrum	--	--	1
Pituophis sp.	Bull snake	vertebrae centrum	--	--	1
?	Snake	vertebrae centrum	--	--	2
?	Turtle	carapace (charred)	--	--	1
?	Bird	ungual phalanx (charred)	--	--	4
"	"	first phalanx	--	--	1

Table 5.9 cont'd.

Genus	Common Name	Element	Right	Left	Indeter. Side
?	Bird	third phalanx (charred)	--	--	1
?	Fish	vertebrae	--	--	3
?	No identification	phalanges (charred)	--	--	7
?	No identification	ulna	--	--	1

Table 5.10

Habitat Preferences of Identified Animals

Identified animals	Habitat preferences
Sylvilagus floridanus Cottontail	prefers open brush or forest edge habitats but also adaptable to grassy environments
Symptomys cooperi Southern lemming mouse	prefers heavy stands of bluegrass in low, moist places; also bogs, swamps and damp woods
Geomys bursarius Plains pocket gopher	prefers open grasslands
Tamias sp. Ground squirrel	prefers wooded areas or among bushes or tall grasses
Odocoileus virginianus White-tailed deer	prefers forest edge, but generally adaptable to grassy areas
Family *Colubridae*	
Elaphe Rat snake	prefers forested areas, particularly rocky hillsides of open woodlands
Lampropeltis King snake	adaptable to many habitats (rocky hillsides, open woods, prairie grassland)
Pituophis Bull snake	adaptable to many habitats (open grasslands, open woodland, woodland edge); particularly common in cultivated fields with high rodent populations

Table 5.11

Potential Meat Represented by Recovered Faunal Remains

Species	kg average live weight	% of usable meat	kg usable meat
Odocoileus virginianus	90.7	50	45.40
Geomys bursarius	.45	70	.32
Sylvilagus floridanus	1.60	50	.80
		total	46.52 kg. meat

Population	kg each/day meat	kg total each/day
three men	5.45	16.35
three women	2.70	8.10
three children	1.40	4.20
		28.65 kg/day

The minimum number of animal species represented in the assemblage could potentially yield 46.5 kg of meat (White 1953:11-15) (Table 5.11). Where the major dietary dependence is on meat, large quantities are usually consumed, much larger than when meat is supplementary to a diet based on vegetal food.

Cowie (1913:215-216) describes the daily allowance of meat at Fort Qu'Appelle in 1867-1868. Men received 5.5 kg of fresh bison meat or 2.7 kg of dried meat, or 1.4 kg of pemmican each day. Women received one-half of the men's allowance and each child one-quarter of the men's allowance.

The occupants of the Sperry site were undoubtedly hunter-gatherers, with a reliance upon vegetal foods in addition to meat. However, using Cowie's figures as a rough bases to determine the number of individuals and length of occupation of the site can yield useful information.

The recovery of one hearth, pit oven, trash pit, and one grinding station, in addition to the quantity of cultural remains, suggests the site was occupied for only a short duration by a small group of persons. Thus, for the sake of simplicity, a population of three men, three women and three children could be sustained, by the potential meat represented by the recovered faunal remains, for a period of less than two days (Table 5.11). This short duration appears unreasonable.

Three hypotheses may account for the general lack of recovered faunal remains: 1. The inhabitants periodically cleaned their living space, thereby disposing of their garbage at some distance from the primary activity areas; 2. The inhabitants were sustaining themselves primarily on a vegetal diet, thereby reducing the necessary quantity of meat for subsistence; or, 3. A combination of both of the above hypotheses, where periodic garbage disposal away from the primary activity areas and a substantial reliance upon vegetal foods resulted in a low recovery of archaeological faunal remains.

The data tends to support the last hypothesis. The quantity of broken pottery, in addition to other cultural remains, suggests occupation was longer than two days. The available data does not provide enough information for the determination of human demographic and social conditions of the Late Woodland component.

Category 1111: Floral Remains (N = 47 charred)

Table 5.12 lists the floral remains recovered from the excavations. Since uncarbonized plant remains deposited at the site during the prehistoric occupation would have soon decomposed, all uncarbonized floral remains are considered intrusive and recent in nature (Asch et al. 1972); therefore, only charred remains are used in reconstructing subsistence and seasonality of site occupation. A control sample of flotation remains was made (Table 5.12) to substantiate the probable recent nature of the uncharred remains.

The preferred habitats occupied by the various plants represented in the sample are listed in Table 5.13. Examination of only charred seeds which were identified, the genera represented are plants which grow well in disturbed habitats. Considered in a prehistoric context, such areas are disturbed and have nitrogen-enriched soils. These are characteristics of prehistoric habitation sites and "some wild plants became 'weedy camp-followers' adapted to this niche" (Asch and Asch 1977:7).

One genera, Cayra sp., is listed as inhabiting an area other than a waste area. However, this genera prefers floodplain and upland forest habitats. It appears, from the available data, that the inhabitants were

Table 5.12

Floral Remains Recovered from the Sperry Site, 23JA85

Family	Genus	Common Name	Charred	Uncharred
Amaranthaceae	*Amaranthus*	Pigweed	5	419
Chenopodiaceae	*Chenopodium*	Goosefoot	36	18
Cyperacceae	unidentifiable	Sedges	1	--
Fabaceae	unidentifiable	Pea Family	1	1
Gramineae	*Festuca*	Fescue Grass	2	--
Juglandaceae	*Carya*	Hickory	2	--
Control Pit:	Identified seeds recovered from an area not associated with the archaeological site.			
Amaranthaceae	*Amaranthus*	Pigweed	--	55
Chenopodiaceae	*Chenopodium*	Goosefoot	--	8
Compositae	*Ambrosia*	Ragweed	--	4
Polygonaceae	*Polygonum*	Smartweed	--	3
Portulacaceae	*Portulaca*	Purslane	--	80

Table 5.13

Preferred Habitats of Identified Floral Remains

Genus	Floodplain Forest	Upland Forest	Open Woodland	Prairie	Marsh/Pond Margin	Waste Areas
Amaranthus	--	--	--	--	--	X
Chenopodium	--	--	X	--	--	X
Ambrosia	X	--	--	X	--	X
Festuca	--	X	X	X	--	X
Carya	X	X	--	--	--	--
Polygonum punctatum	X	--	--	--	X	--
Polygonum pens	--	--	--	--	X	X
Portulaca	--	--	--	--	--	X

From Jones and Beli 1974: 1-11

Table 5.14

Berry and Seed Availability Represented by Charred Remains

Genus	Month
Amaranthus spp. (Pigweed)	June-October
Carya sp. (Hickory)	October
Chenopodium (Goosefoot)	May-November
Festuca (Fescue Grass)	July-October

exploiting flora in the immediate vicinity of the site. The edible genera include Amaranthus, Chenopodium, Carya, Fabaceae and Festuca. All of the genera have edible seeds which may be collected from late summer into the fall (Table 5.14). O'Malley (1979:66-73), hypothesized a fall/winter occupation based upon the preponderance of fall-maturing seed genera and the unlikelyhood of spring and early summer occupations due to river flooding.

However, with all of the available evidence, including the recovery of a mud daubers wasp nest, a late summer and early fall occupation seems more reasonable. This is based upon the assumption that a prehistoric, human made, structure existed for the building and subsequent protection of the mud daubers nest. As stated earlier, the mud daubers nest would have to have been made prior to mid-October, therefore substantiating the existence of a structure on the site prior to this time. Since the mud daubers nest was charred and not found in the context of a feature, it may also be assumed that the structure burned. Therefore, it is hypothesized that the site was inhabited during at least the late summer and early fall.

Based on the faunal and floral remains, however limited they may be, the following points can be made:

1. All of the animals represented inhabit lowland environments, specifically forests and forest edge areas.
2. The deer is the largest animal represented in the faunal assemblage.
3. Floral remains indicate a reliance on seed plants whose preferred habitats are disturbed areas and which mature in the fall.
4. The exploitation of nut resources is indicated by charred Carya nutshells (O'Malley 1979:73-74).
5. The Late Woodland component represents at least a late summer and fall occupation.

Artifact Distributions

Figure 5.32 shows the distribution of chips and flakes within the east excavation. One cluster is discernible around feature 1. This suggests the locus for the manufacture of chipped stone tools.

Figure 5.33 shows the distribution of pottery. Three clusters are discernible. The first is north of feature 2. The second is around feature 1 and the third is in the southern portion of the excavation. These pottery clusters consist of both plain and cordmarked sherds. Examination of figures 5.32 and 5.33 illustrates the spatial separation of pottery and chips and flakes. These distributions suggests the spatial separation of men's and women's activities. It appears either pottery manufacture or food preparation tasks were spatially segregated from chipped stone tool manufacture or their subsequent use.

Figures 5.34 to 5.36 show the locations of more specific tool forms. Figure 5.34 shows the locations of marginally modified chips, flakes, shatter, denticulates and notches. Marginally modified flakes are the only tools with a discernible pattern. They tend to occur around the periphery of feature 2 and in the southern portion of the excavation.

Figure 5.35 shows the locations of gravers, end scrapers, disto-lateral scrapers, light duty preforms and knives, and micro duty preforms. Light duty preforms and knives tend to have the same general distribution as do the retouched flakes (Fig. 5.32).

Figure 5.36 shows the locations of heavy duty preforms, composite tools, notched, micro duty projectile points, unnotched micro duty projectile points and light duty projectile points. Composite tools tend to

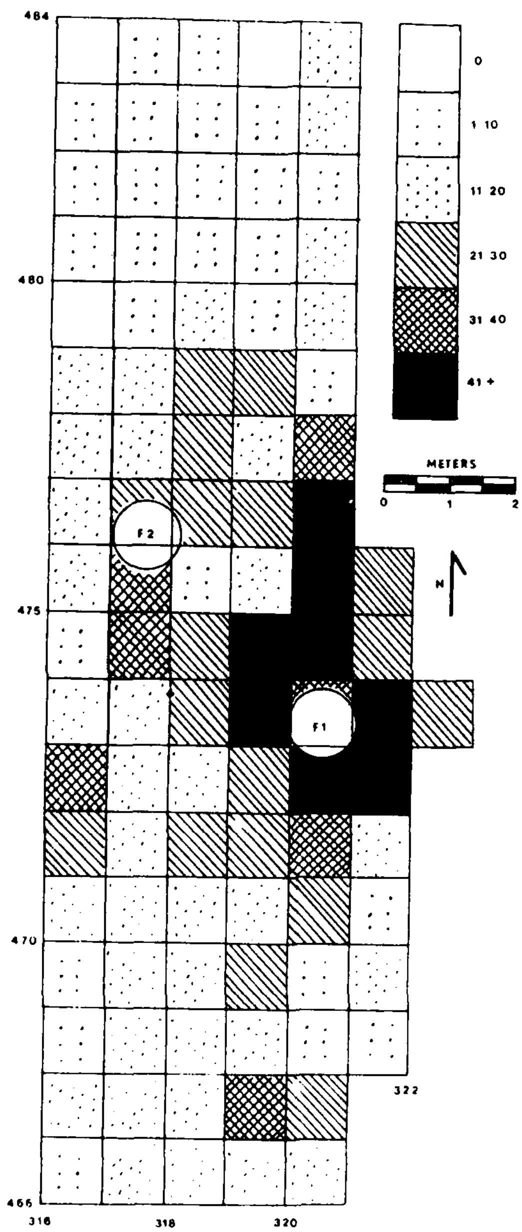


Figure 5.32 Distribution of unmodified chips and flakes within the east excavation unit at 23JA85.

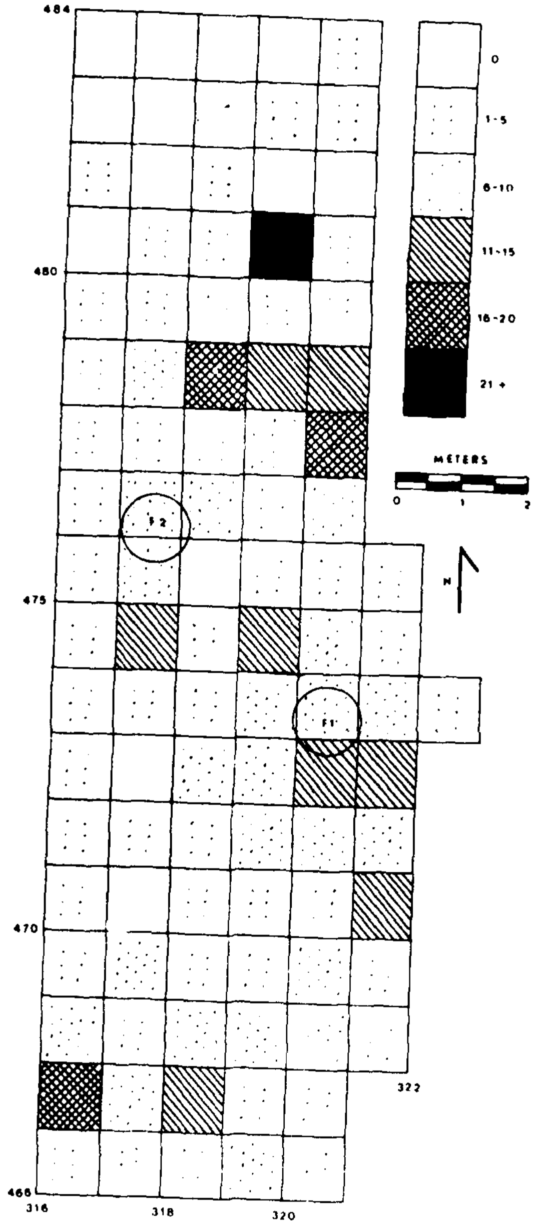


Figure 5.33 Distribution of pottery sherds within the east excavation unit at 23JA85.

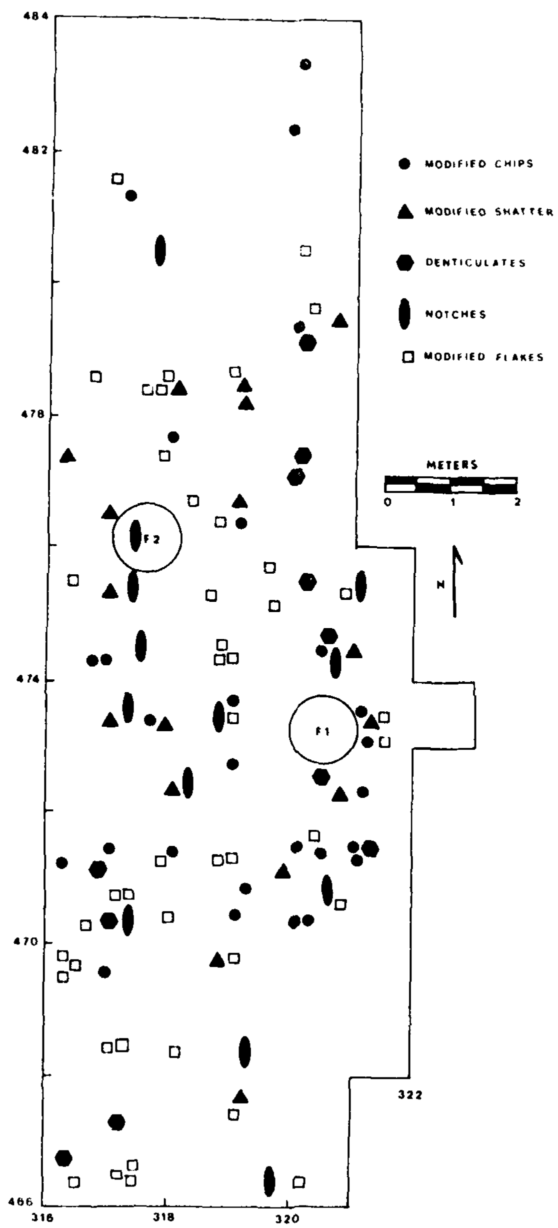


Figure 5.34 Distribution of modified chips, flakes, shatter, denticulates, and notches within the east excavation unit at 23JA85.

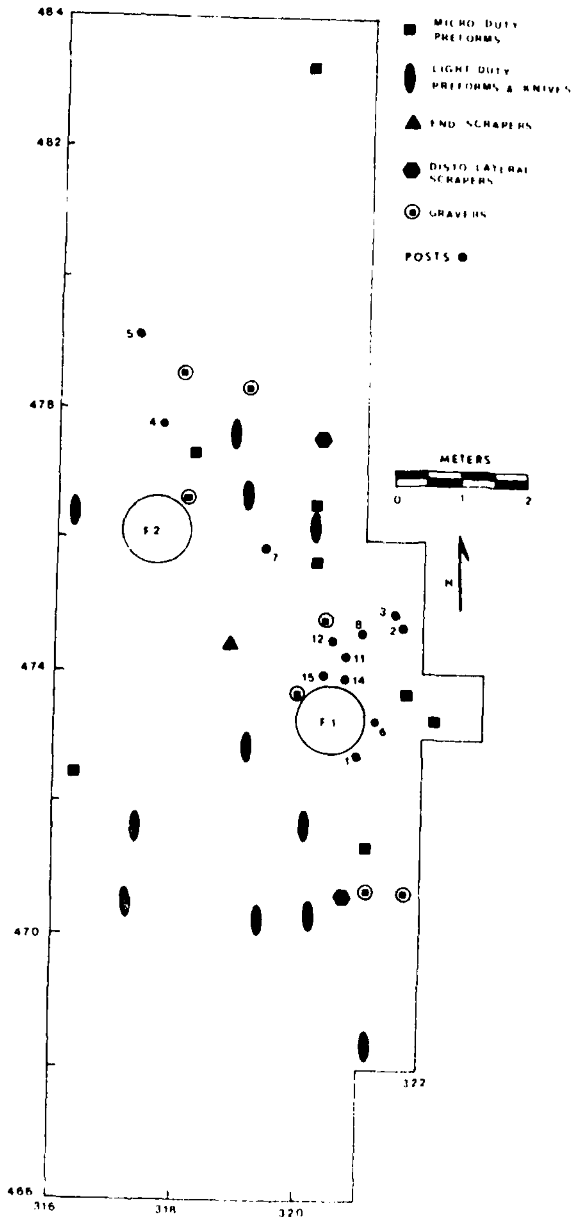


Figure 5.35 Distribution of micro duty preforms, light duty preforms or knives, end scrapers, disto-lateral scrapers, gravers and post molds within the east excavation unit at 23JA85.

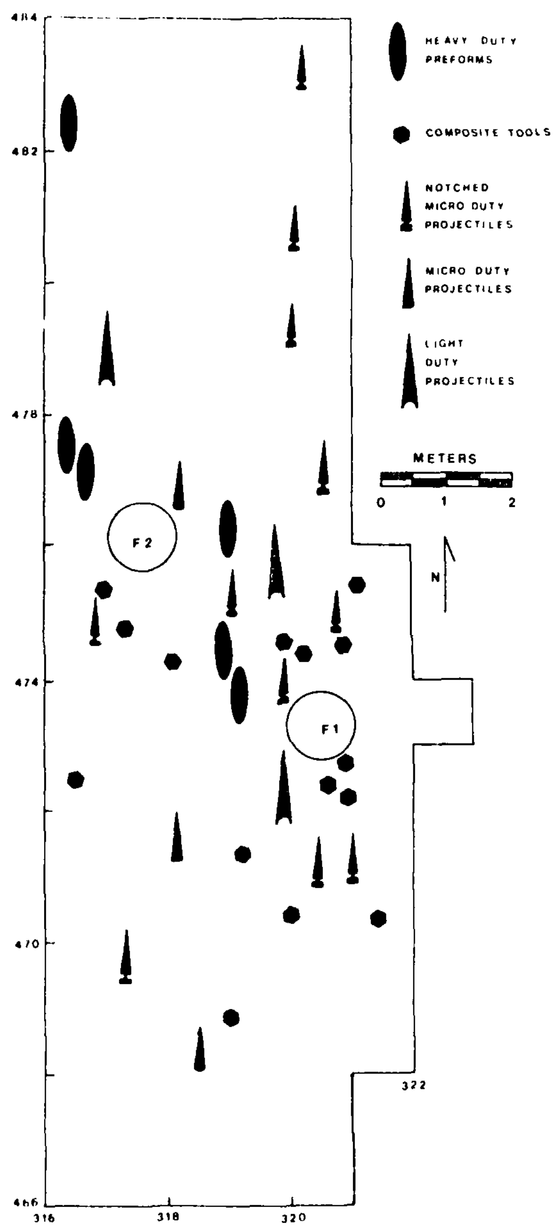


Figure 5.36 Distribution of heavy duty preforms, composite tools, notched micro duty projectile points, micro duty projectile points and light duty projectile points within the east excavation unit at 23JA85.

cluster around feature 1 while heavy duty preforms are near features 1 and 2. Projectile points tend to be diffuse in their distribution.

Distributions of Artifacts in the West Excavation

Figures 5.37 to 5.40 show the distributions of artifacts within the west, 61.5 m^2 excavation. Figure 5.37 shows the distribution of chips and flakes. A few chips and flakes occur in feature 6 and in an area around 299 meters east and 482 meters north. The lack of chipping debris near feature 3, a hearth or pit oven, should be noted.

Figure 5.38 shows the distribution of pottery. There are no discernible clusters of sherds.

Figure 5.39 shows the locations of modified chips, flakes, shatter, denticulates and notches. These tools are all associated around feature 6.

Figure 5.40 shows the locations of postmolds, end scrapers, distolateral scrapers, micro duty preforms and light duty preforms and knives. These tools are also associated with feature 6.

The plotting of artifact locations within the west excavation makes the lack of hunting tools apparent. No projectile points were recovered from the west excavation. It appears most activities performed in the west excavation were done with metates, abraders and marginally modified chips, flakes and shatter.

On the basis of the distribution of the pottery and stone tools, it is hypothesized that differential activity areas, related to a division of labor by sex, can be recognized at the Sperry site. The lack of chipped stone tools associated with hunting activities in the west excavation supports the contention that the area was used by women. The east excavation, on the other hand, is believed to represent the remains of activities performed by both men and women. If it is assumed that the east and west excavation areas were occupied simultaneously, then the pattern of artifacts and features indicate spatial separation between activity areas related to a division of labor by sex.

Attribute Analysis of Pottery Sherds

Attribute analysis of the 316 sherds was by use of the SPSS Library Subroutine Crosstabs (Nie et al. 1975). The chi-square and Cramer's V tests of statistical association were used in this analysis. Using chi-square and Cramer's V statistics can lend a substantial amount of information about attribute associations. All chi-square values used in the following analysis are significant at the .05 level and all Cramer's V statistics are greater than .30.

Chi-square is a test for a systematic relationship between two variables. This is done by initially computing cell frequencies which would be expected if no relationship existed between attributes given the existing row and column totals. The expected cell frequencies are then compared to the actual values found in the table. The greater the discrepencies between the expected and the actual frequencies, the larger chi-square becomes.

Chi-square helps only to decide whether variables are independent or related. It does not tell how strongly they are related, as sample size and table size have an influence upon chi-square. Cramer's V is a statistic which adjusts for factors effecting chi-square. Cramer's V ranges from 0 to +1. A large value of Cramer's V signifies that a high degree of association exists between attributes, without revealing the manner in which the attributes are associated (Nie et al. 1975:223-225).

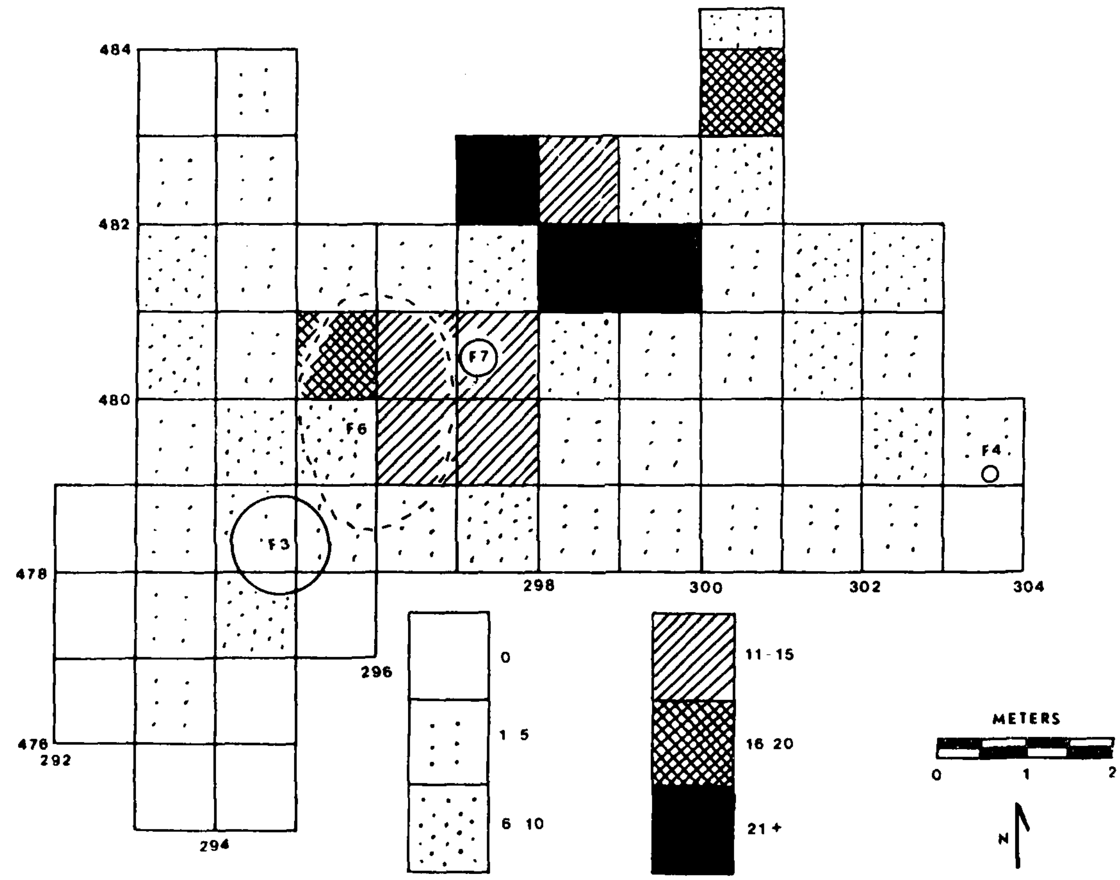


Figure 5.37 Distribution of unmodified chips and flakes within the west excavation unit at 23JA85.

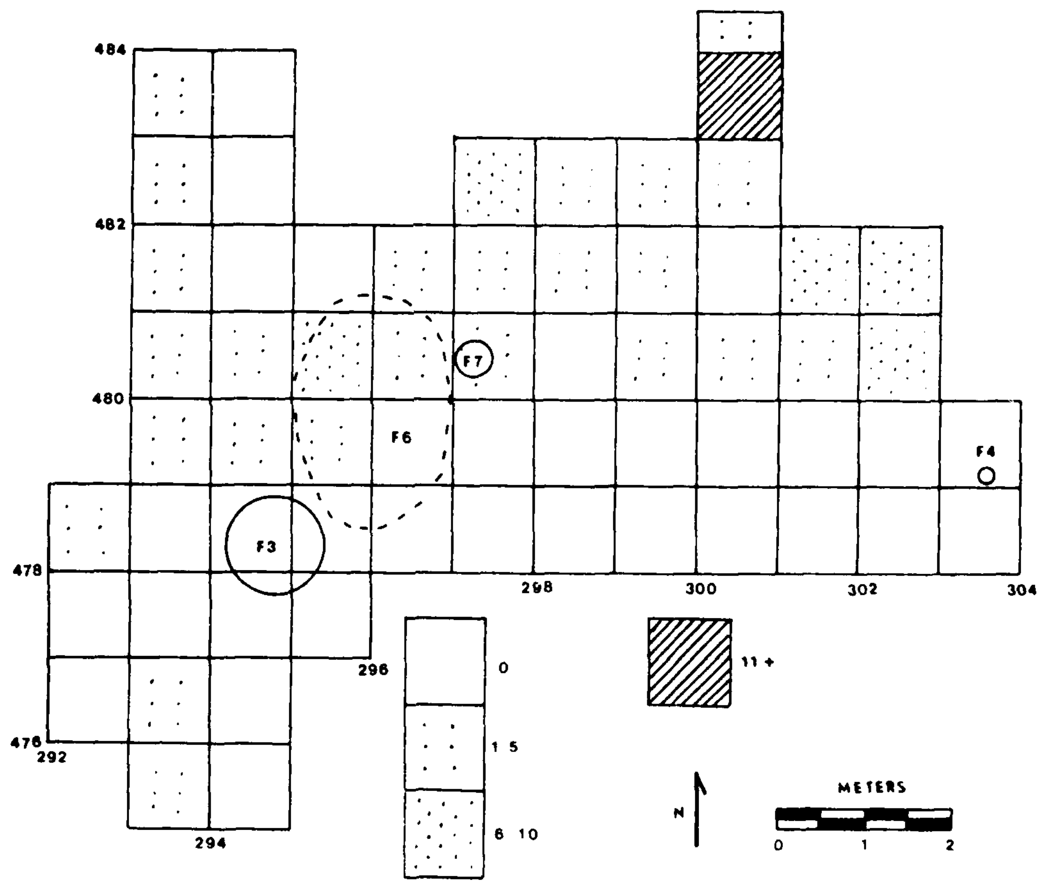


Figure 5.38 Distribution of pottery sherds within the west excavation unit at 23JA85.

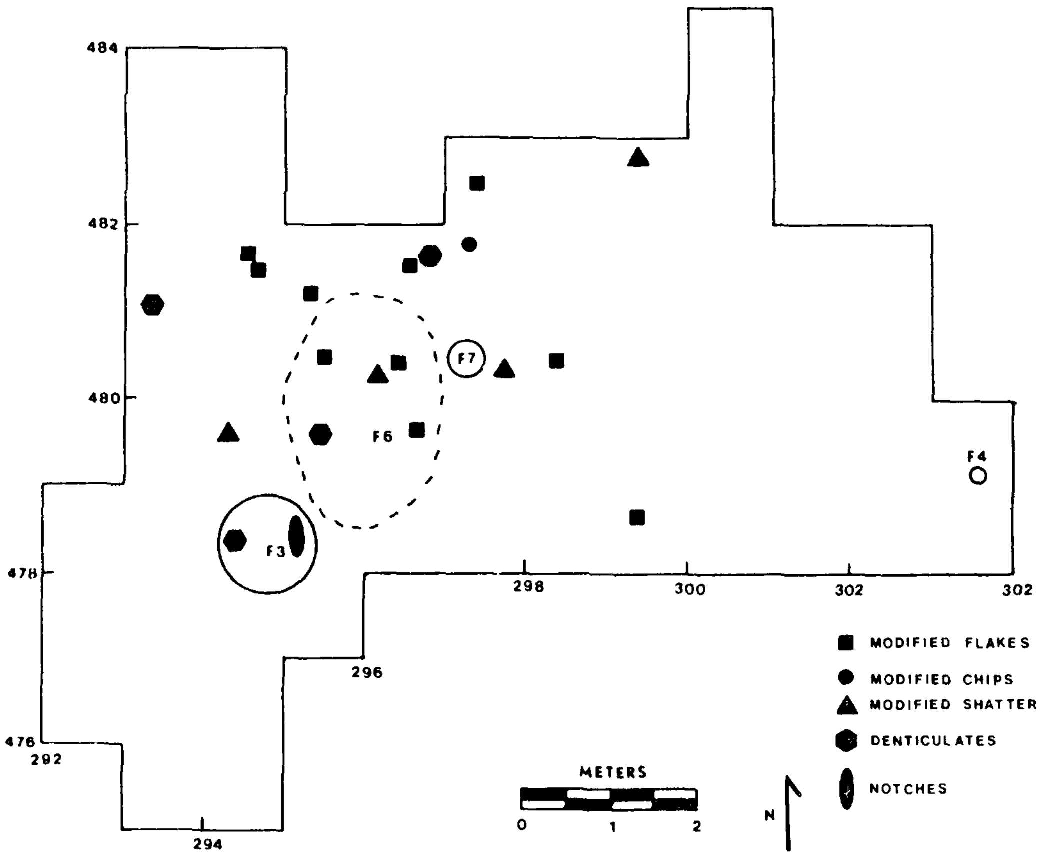


Figure 5.39 Distribution of modified chips, flakes, shatter, denticulates and notches within the west excavation unit at 23JA85.

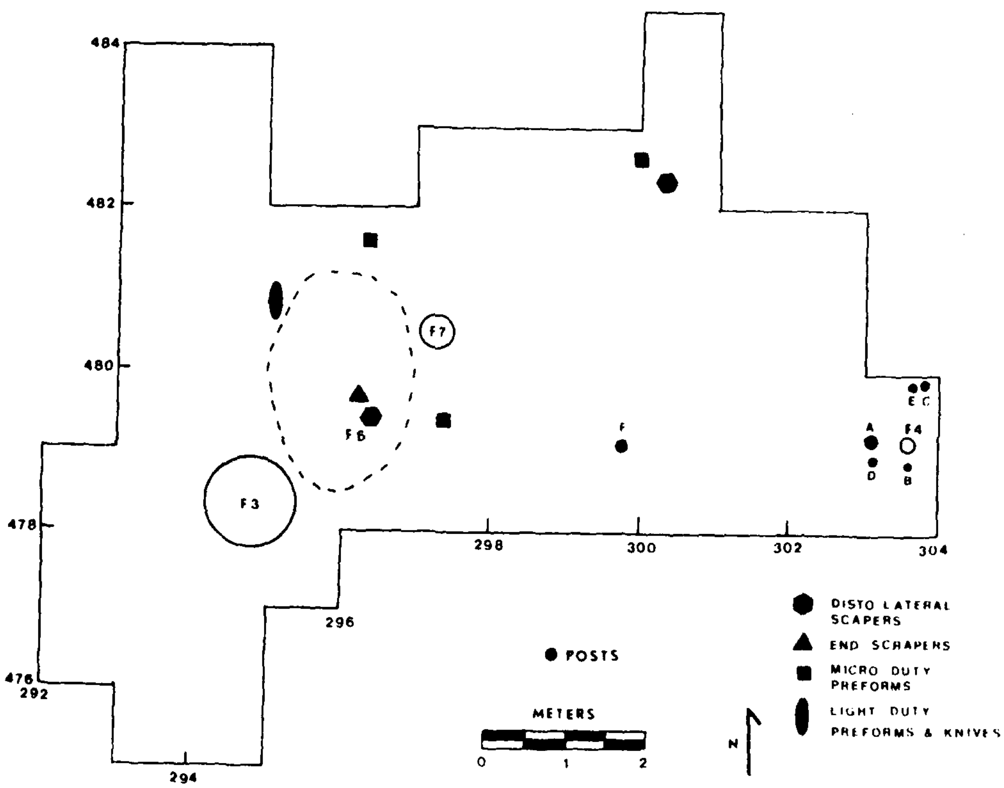


Figure 5.40 Distribution of disto-lateral scrapers, end scrapers, micro duty preforms and light duty preforms or knives within the west excavation unit at 23JA35.

Results of the Analysis

Hematite inclusions in the paste are associated with lighter interior paste colors.

Plain sherds $X^2 = 42$ Cramer's V = .40

Hematite inclusions in the paste are also associated with lighter core color s.

Cordmarked sherds $X^2 = 23$ Cramer's V = .63

Exterior paste color and interior paste color have a positive association, as one becomes darker so does the other.

Plain sherds $X^2 = 376$ Cramer's V = .43

Cordmarked sherds $X^2 = 58$ Cramer's V = .45

Interior paste color and core color have a positive association.

Plain sherds $X^2 = 348$ Cramer's V = .43

Cordmarked sherds $X^2 = 162$ Cramer's V = .64

The presence of a carbon streak has a positive association with darker interior paste colors.

Plain sherds $X^2 = 51$ Cramer's V = .45

The presence of a carbon streak has a positive association with darker core colors.

Plain sherds $X^2 = 156$ Cramer's V = .77

Cordmarked sherds $X^2 = 100$ Cramer's V = .95

The presence of a carbon streak has a positive association with darker exterior paste colors.

Plain sherds $X^2 = 49$ Cramer's V = .44

Exterior paste color has a positive association with core color.

Cordmarked sherds $X^2 = 65$ Cramer's V = .48

Darker interior paste colors have a positive association with smaller tempering particles.

Plain sherds $X^2 = 337$ Cramer's V = .43

Curshed granite temper is associated with the thinnest sherds, sand temper is associated with the thickest sherds, and sherd temper occurs between the above two extremes. This relationship has functional implications. Clay tends to bond better with angular particles, while clay does not adhere as well to rounded particles. The use of angular, crushed granite allows the manufacture of thinner walled vesseis (Shepard 1956:27).

Rim sherds $X^2 = 33$ Cramer's V = .70

Larger rim diameters are associated with thicker shoulders.

Rim sherds $X^2 = 123$ Cramer's V = .79

The above anaysis allows formulation of the following conclusions:

Pottery Manufacture

Hematite natural paste inclusions are associated with lighter exterior and interior paste colors. The selection of clays with natural hematite particles may have been preferred for tempering purposes and lighter vessel colors. The fact that exterior and interiors, and interior and core colors are associated is probably a product of firing methods. It should be noted that exterior colors are associated with interior colors, but not core colors. Interior colors are associated with core colors. This pattern suggests a firing gradient, with exterior portions of vessels most highly oxidized, interior portions oxidized somewhat less and core areas least oxidized. This pattern suggests the placement of the vessels at the time of their firing was either upright or inverted.

Functional Associations

Analysis of the rim sherds suggests a minimum of two functional associations. First, rim diameter is associated with shoulder thickness. This suggests that a larger orifice requires a stronger (thicker) shoulder for support. The association between rim diameter and shoulder thickness allows a regression line to be fitted to these two attributes, and for rim diameter to be predicted on the basis of shoulder thickness. A sample of 15 rim sherds (those complete enough to measure rim diameter and shoulder thickness), were submitted to a linear regression analysis, BMDP1R (Dixon 1975:453).

Rim diameter was made the independent variable, shoulder thickness the dependent. Figure 5.41 show the results of the analysis. The slope of the regression line (.36) allows insertion of new data (shoulder thicknesses) to predict the probable rim diameters of pottery vessels.

A functional explanation is also suggested by the fact that tempering material is related to body thickness. Crushed granite is associated with thinner pottery, sand is associated with the thickest pottery, and sherd temper occurs between the above two extremes. These associations are related to the ability of clay to bond better with angular temper particles, thus allowing the manufacture of thinner-walled pottery. Sand is by definition more rounded, thus clay does not adhere well, making it necessary to produce thicker-walled pottery (Shepard 1956:27).

Tests for Random Patterning

The following analyses are an attempt to discern patterning in the distribution of the sherds within the east and west excavations. Two different aspects of patterning are examined. First, the distribution of each group of sherds is examined for randomness. Second, the plain sherds are examined for evidence of spatial association with cordmarked sherds.

One method to search for randomness is defined as a map that consists of a collection of points located within a region has a random pattern whenever the locations of the points are consistent with the hypothesis that each point is located in the region so that it is also located within any subregion (Dacey 1973:320).

The total sherd collection from the east and west excavations was used for the following tests. Two measurements were made: 1. counts of sherds; and, 2. weight of all sherds within each excavation unit. Two grid sizes were used: 1. 50 cm^2; and, 2. one m^2 excavation units. The two grid sizes were used to determine the amount of spatial information lost when excavating in one m^2 rather than 50 cm^2. This information should be valuable in structuring future archaeological field excavations and determining quality control in excavation techniques.

Initially the counts and weights (grams) of the total, plain and cordmarked sherds were submitted to SPSS Library Program Subroutine Crosstabs (Nie _et al_. 1975) to determine the frequencies and weights of pottery sherds within each 50 cm^2 and one m^2 excavation unit. These cell count maps were used for the tests for random patterns (Figs. 5.42 to 5.47). The variance-mean ratio was used for testing the presence of a random pattern. The variance-mean ratio test uses the mean m and variance v of the n quadrat counts that summarize a map. If v/m is close to one, this is evidence that the map has a random pattern. Under the hypothesis that a map has a random pattern, the ratio nv/m for n quadrats is a statistic and is distributed as the chi-squared distribution, $X^2 n-1$, with n - 1 degrees of freedom. This test is sensitive to the size of the

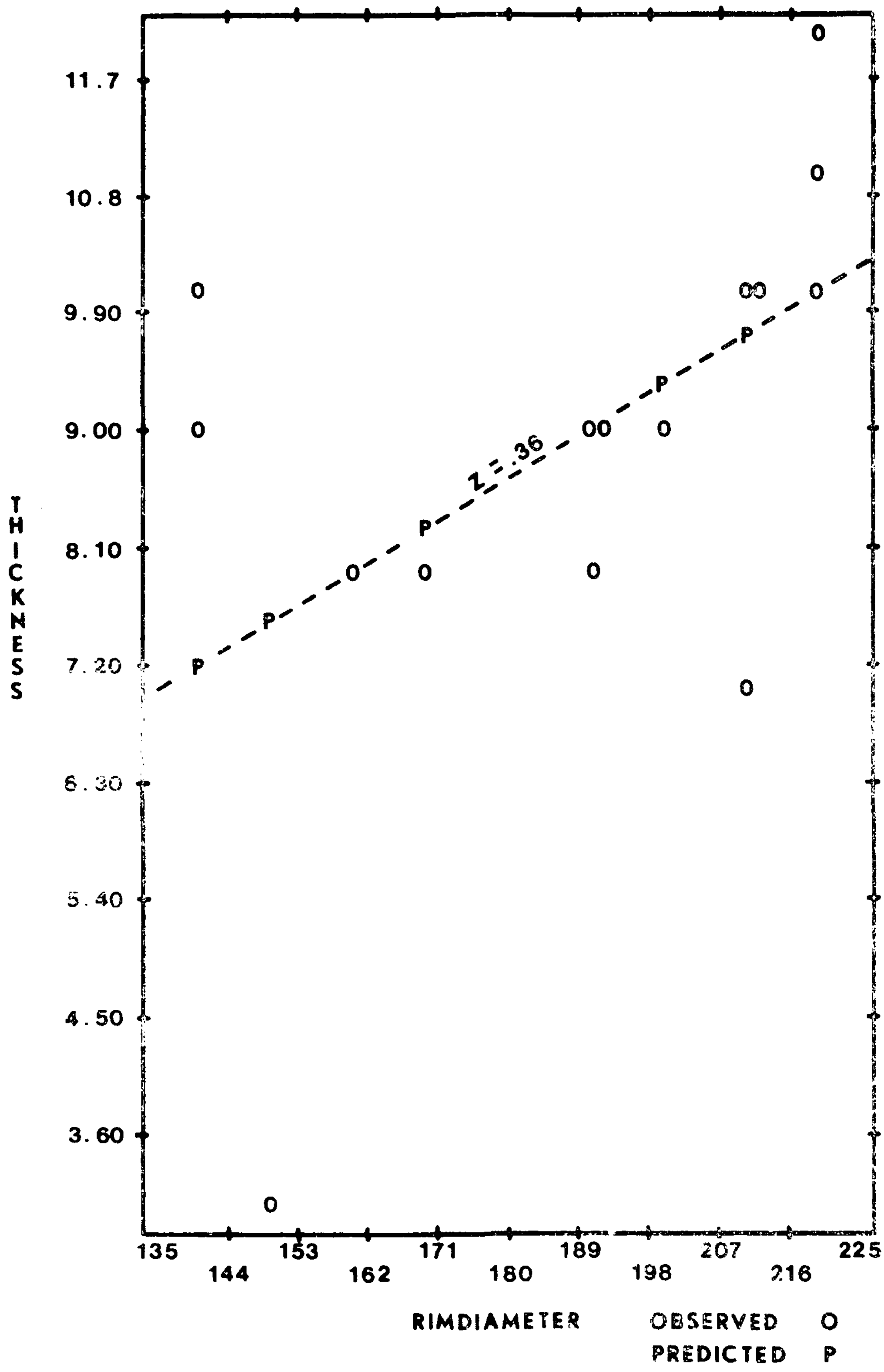


Figure 5.41 Plot of the regression line fitted to rimdiameter and shoulder thickness.

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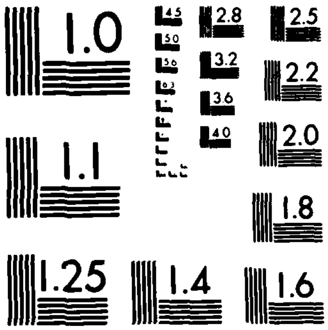

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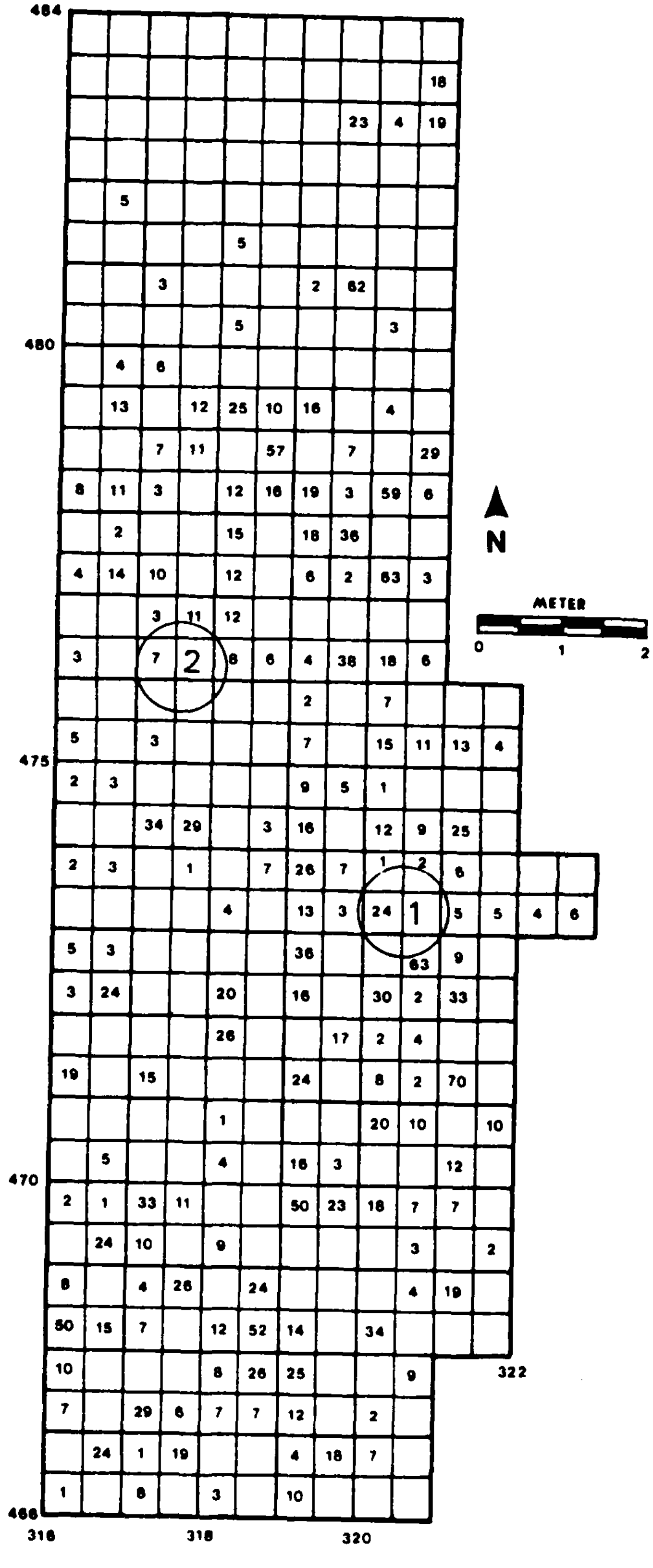

Figure 5.42 Map showing the weight of all pottery sherds within each 50 cm^2 in the east excavation at 23JA85.

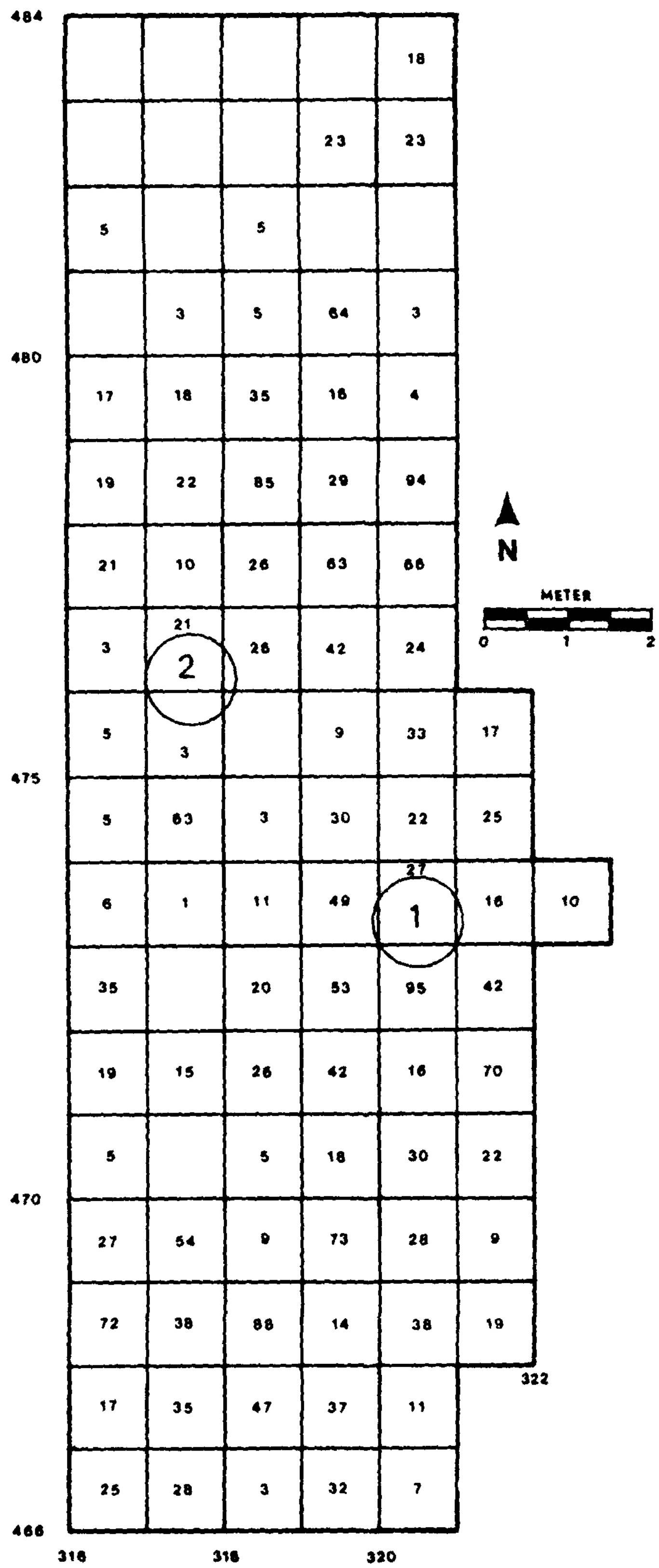

Figure 5.43 Map showing the weight of all pottery sherds within each one m^2 in the east excavation at 23JA85.

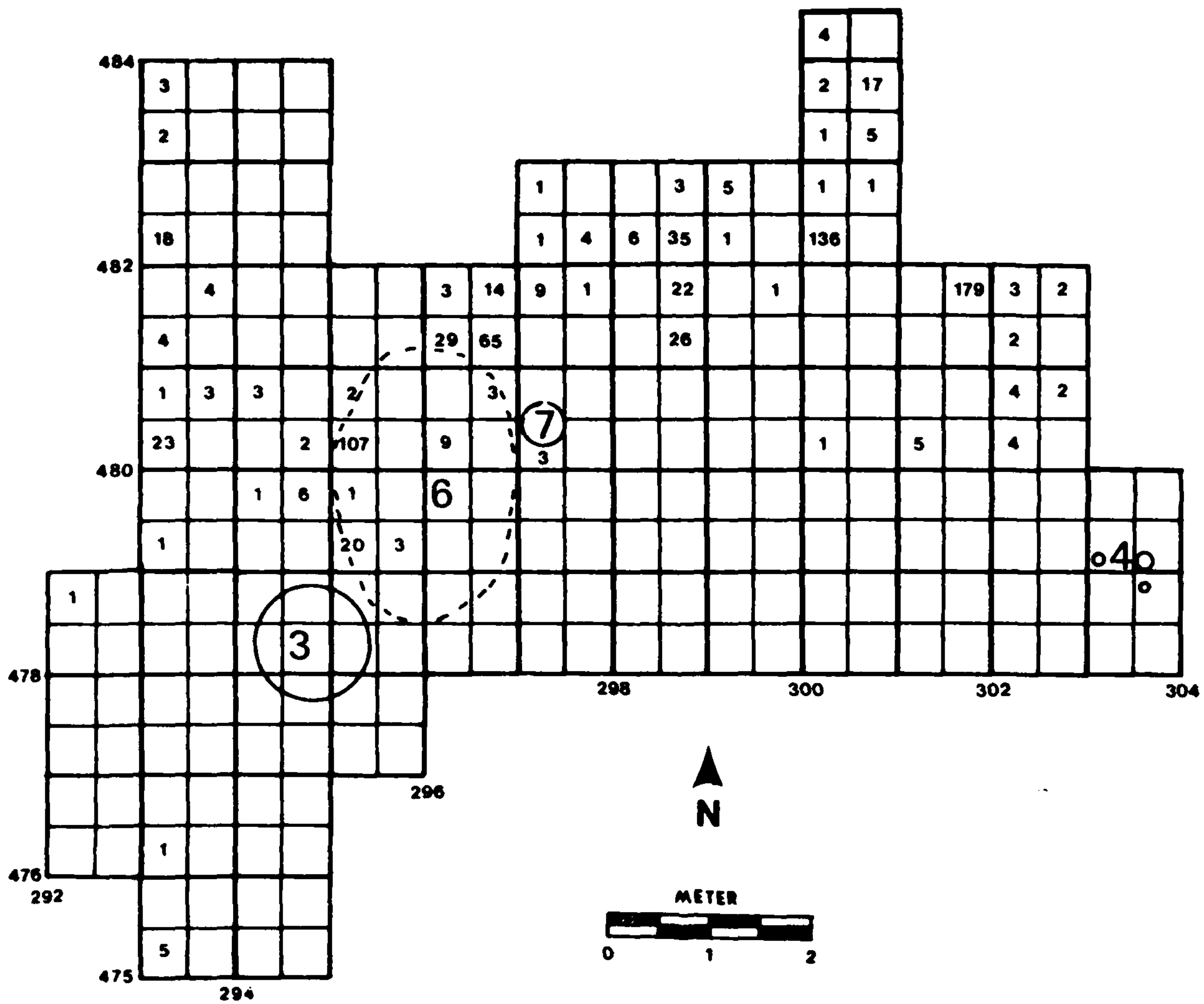

Figure 5.44 Map showing the weight of all pottery sherds within each 50 cm² in the west excavation at 23JA85.

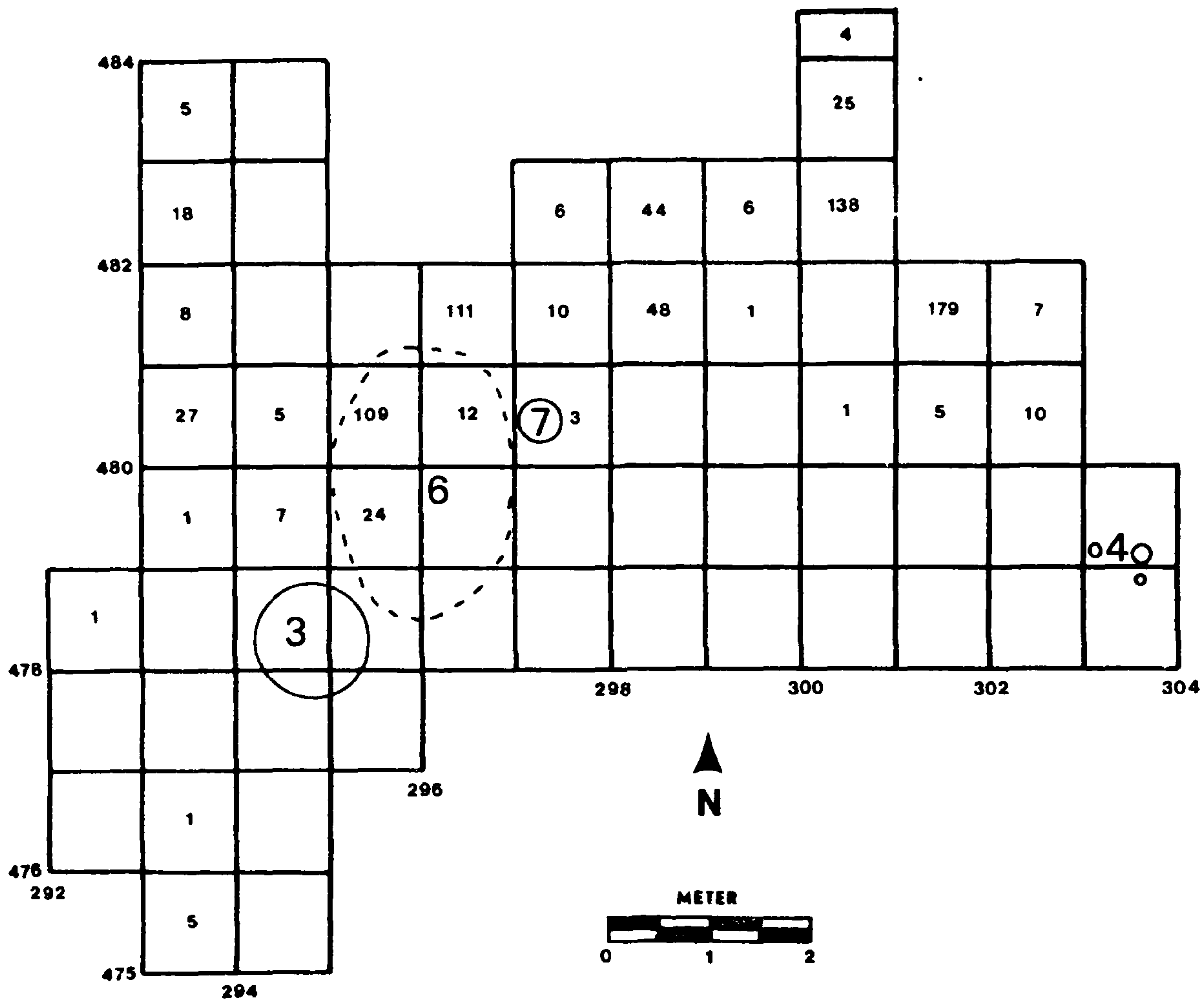

Figure 5.45 Map showing the weight of all pottery sherds within each one m^2 in the west excavation at 23JA85.

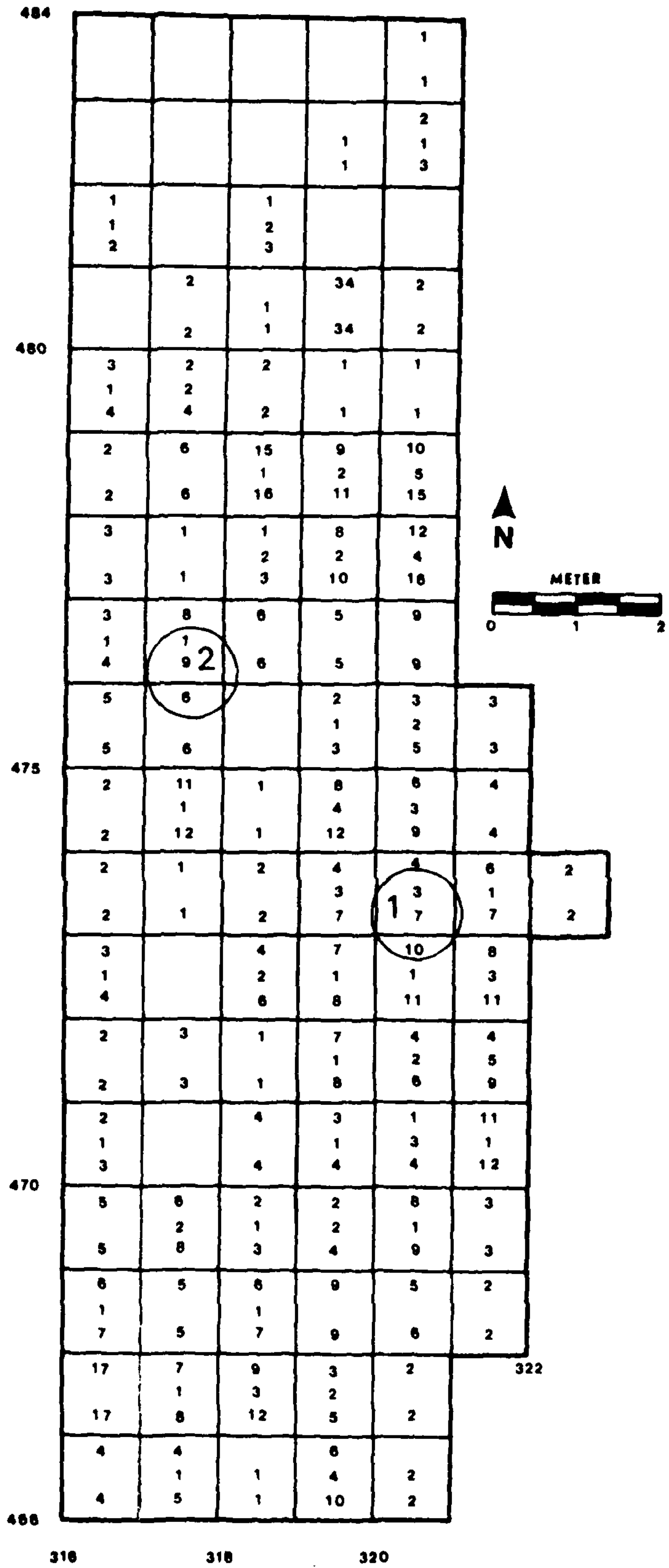

Figure 5.46 Map showing the counts of pottery sherds in each one m^2 in the east excavation at 23JA85.

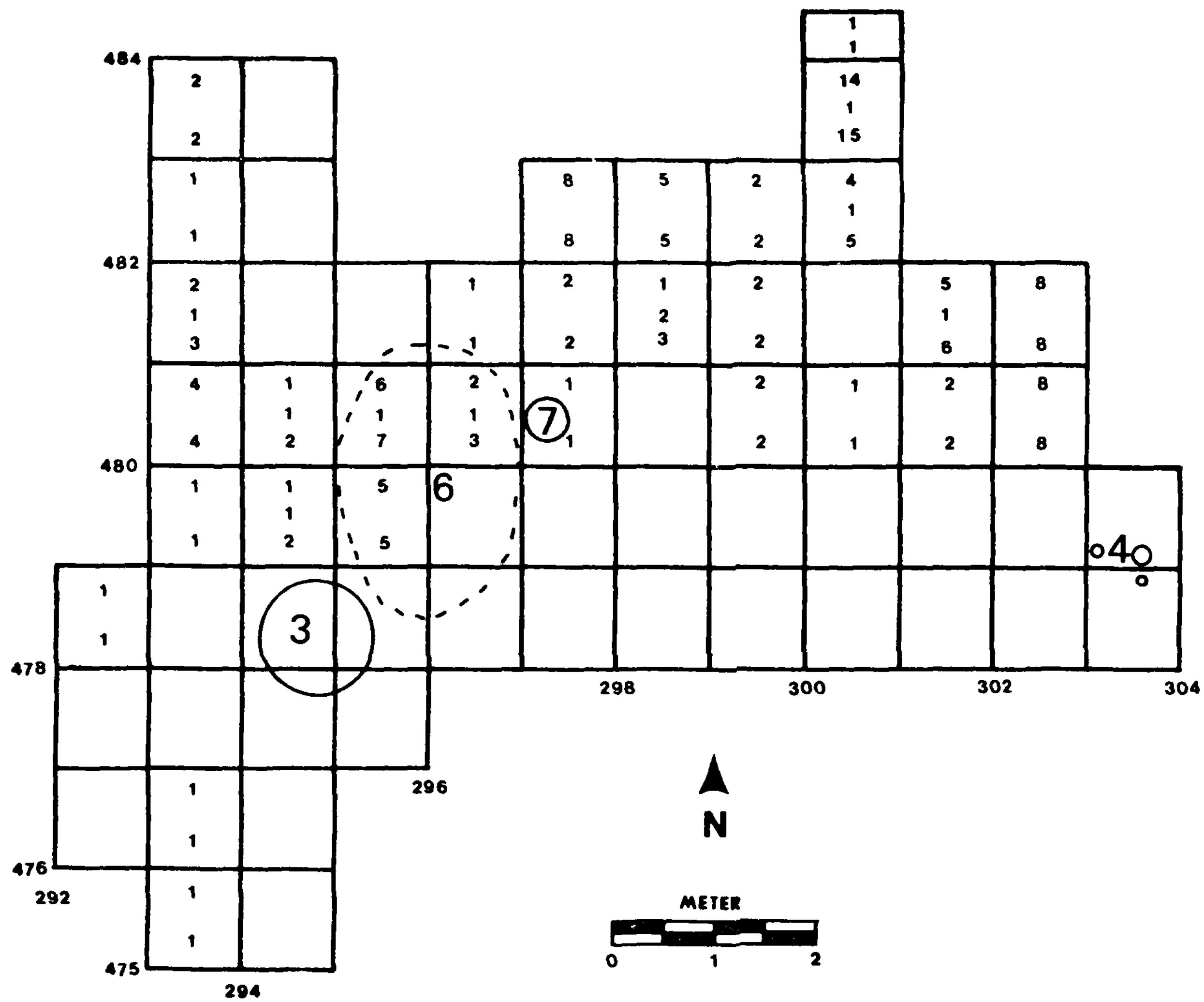

Figure 5.47 Map showing the counts of pottery cherds in each one m^2 in the west excavation at 23JA85.

cells and it is possible that the variance-mean statistic for one size will support the hypothesis of a random pattern but the ratio for a different size of cell will not (Dacey 1973:321). The use of 50 cm^2 cells and one m^2 cells were used as a check for this possibility.

Figures 5.42 to 5.45 give the cell frequencies of the total sherd sample for 50 cm^2 and one m^2 cells according to pottery weight. Tables 5.15 and 5.16 give $X^2 = nv/m$ and the probability that the chi-squared distribution has a value equal to or less than X^2. This probability is obtained from a large table of the chi-squared distribution (Harter 1964). The X^2 is smaller than observed, thus the data do not support the hypothesis that the sherds in the east and west excavations have random patterns according to their weight.

It should be noted that the variance-mean ratio for the 50 cm^2 and one m^2 are approximately the same, 21.69 and 22.80 for the east excavation and 84.31 and 88.66 for the west excavation, respectively. This suggests recognition of spatial patterning is not effected by the two excavation grid sizes tested at this particular site.

Figures 5.46 and 5.47 give the cell frequencies for the total, plain, and cordmarked pottery in one m^2 for the east and west excavations. Tables 5.15 and 5.16 show $X^2 = nv/m$ and the probability that the chi-squared distribution has a value equal to or less than X^2. The X^2 is smaller than observed, thus the data do not support the hypothesis that the total, plain, and cordmarked sherds in the east and west excavations have random patterns according to frequency counts. There is one exception, cordmarked pottery frequencies in the west excavation tend to be random (Table 5.16, significance = .6000). This result is probably due to the small sample of ten cordmarked sherds from the west excavation. The use of 50 cm^2 indicated a non-random distribution. This is a case where grid size and sample size effect the outcome of the variance-mean ratio test for randomness.

The use of the attribute weight is probably a more reliable indicator of pottery distributions within the excavations. The breakage of pottery vessels is a reduction process, so the quantity of pottery pieces may be a factor of pottery quality or durability. Results of the above tests indicate non-random patterning of pottery for both pottery weight and frequencies.

Test for Absence of Spatial Association

The hypothesis that the plain and cordmarked pottery lack spatial association is evaluated indirectly by assessing if the observed and expected values of the relation differ by an amount greater than can be attributed to chance. A large difference implies the presence of spatial association. The relations used in the test are based on binary maps obtained from the above cell count maps. Each cell (excavation unit) is assigned the value of 0 if the number of sherds of a particular type in the cell is less than the mean m of all cell counts; otherwise the cell is assigned the value 1 (Dacey 1973:325). Figures 5.48 and 5.49 show the superposition maps obtained from the cell counts.

Superimposing the binary maps for plain and cordmarked sherds, a superposition map is obtained that identifies the values associated with each cell. A contingency table is used for testing for absence of spatial association. If the plain and cordmarked sherds lack spatial association, so that the locations of the two pottery styles are independent of each other, then the two values of each cell of the superposition map are independent events. The chi-square statistic is used to

Table 5.15

Variance - Mean ratio tests for randomness in the east excavation.

.50 X .50 m^2, pottery weight

Number of squares:	396.0
Sum of total weight:	2346.0
Square mean:	5.92
Standard deviation:	11.33
Variance:	128.38
v/m ratio:	21.69
nv/m value:	8587.58
Significance:	.9999

1 X 1 m^2, pottery weight

Number of squares:	99.0
Sum of total weight:	2346.0
Square mean:	23.73
Standard deviation:	23.26
Variance:	540.97
v/m ratio:	22.80
nv/m value:	2256.89
Significance:	.9999

1 X 1 m^2, total pottery count

Number of squares:	99.0
Sum of total counts:	496.0
Square mean:	5.0
Standard deviation:	5.08
Variance.	25.82
v/m ratio:	5.16
nv/m value:	511.24
Significance:	.9999

Table 5.15 cont'd.

1 X 1 m^2, plain pottery counts

Number of squares:	99.0
Sum of total counts:	408.0
Square mean:	4.11
Standard deviation:	4.67
Variance:	21.80
v/m ratio:	5.30
nv/m value:	525.11
Significance:	.9999

1 X 1 m^2, cordmarked pottery counts

Number of squares:	99.0
Sum of total counts:	89.0
Square mean:	.90
Standard mean:	1.22
Variance:	1.48
v/m ratio:	1.64
nv/m value:	162.80
Significance:	.9999

Chi-Square test for association between plain and cordmarked pottery

East Excavation

symbol	quantity
0	38
1	28
1-0	15
0-1	18

	plain 0	cordmarked 1	sum
0	38	18	56
1	15	28	48
sum	53	46	104

chi-square = 8.74
significance = not significant

Table 5.16

Variance - Mean ratio tests for randomness in west excavation

1 X 1 m^2, cordmarked pottery counts

Number of squares:	62.0
Sum of total counts:	10.0
Square mean:	.16
Standard deviation:	.41
Variance:	.17
v/m ratio:	1.06
nv/m value:	65.88
Significance:	.6000

Variance - Mean ratio tests for randomness in the west excavation

.50 X .50 m^2, pottery weight

Number of squares:	246.0
Sum of total weight:	821.0
Square mean:	3.34
Standard deviation:	16.78
Variance:	281.58
v/m ratio:	84.31
nv/m value:	20739.13
Significance:	.9999

Chi-Square test for association between plain and cordmarked pottery.

West Excavation

symbol	quantity
0	41
1	6
1-0	12
0-1	3

	plain 0	cordmarked 1	sum
0	41	3	44
1	12	6	18
sum	53	9	62

chi-square = 5.26
significance = not significant

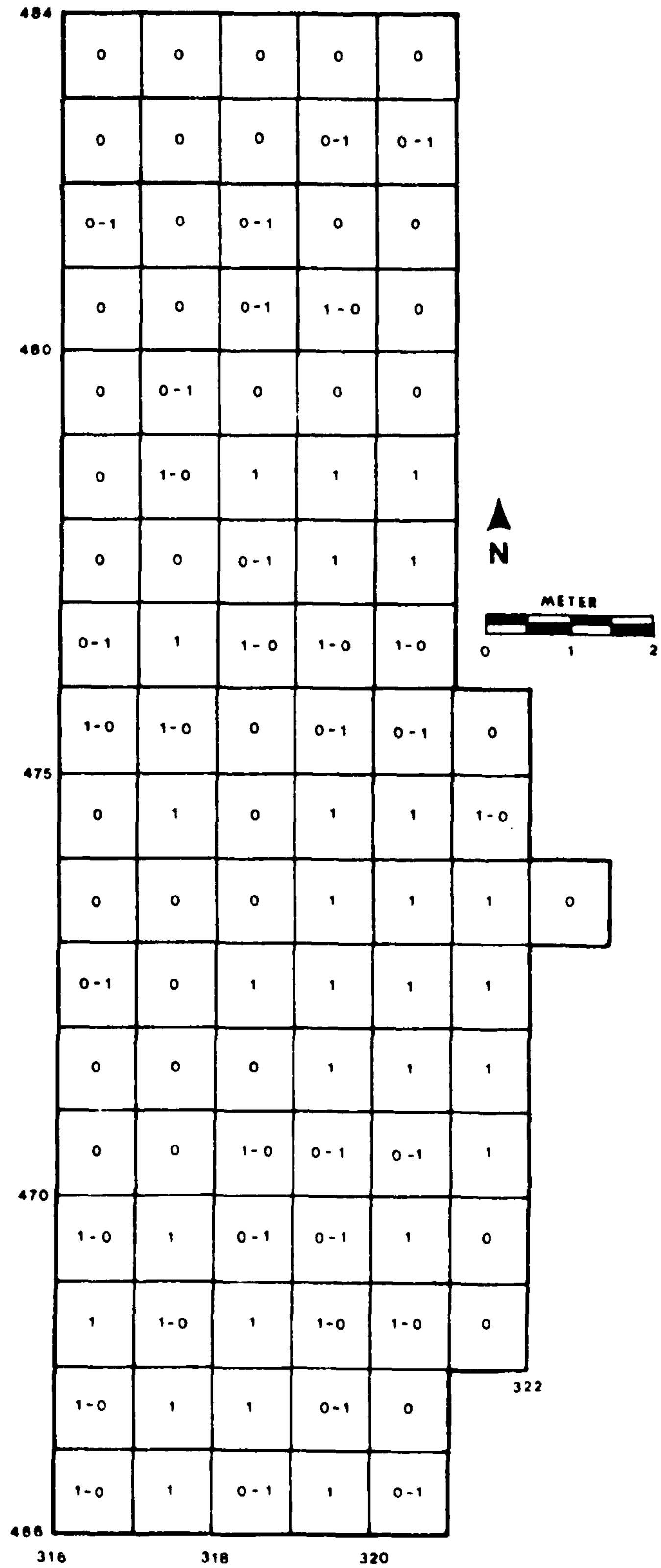

Figure 5.48 Binary map showing the assigned values of each one m^2 in the east excavation at 23JA85.

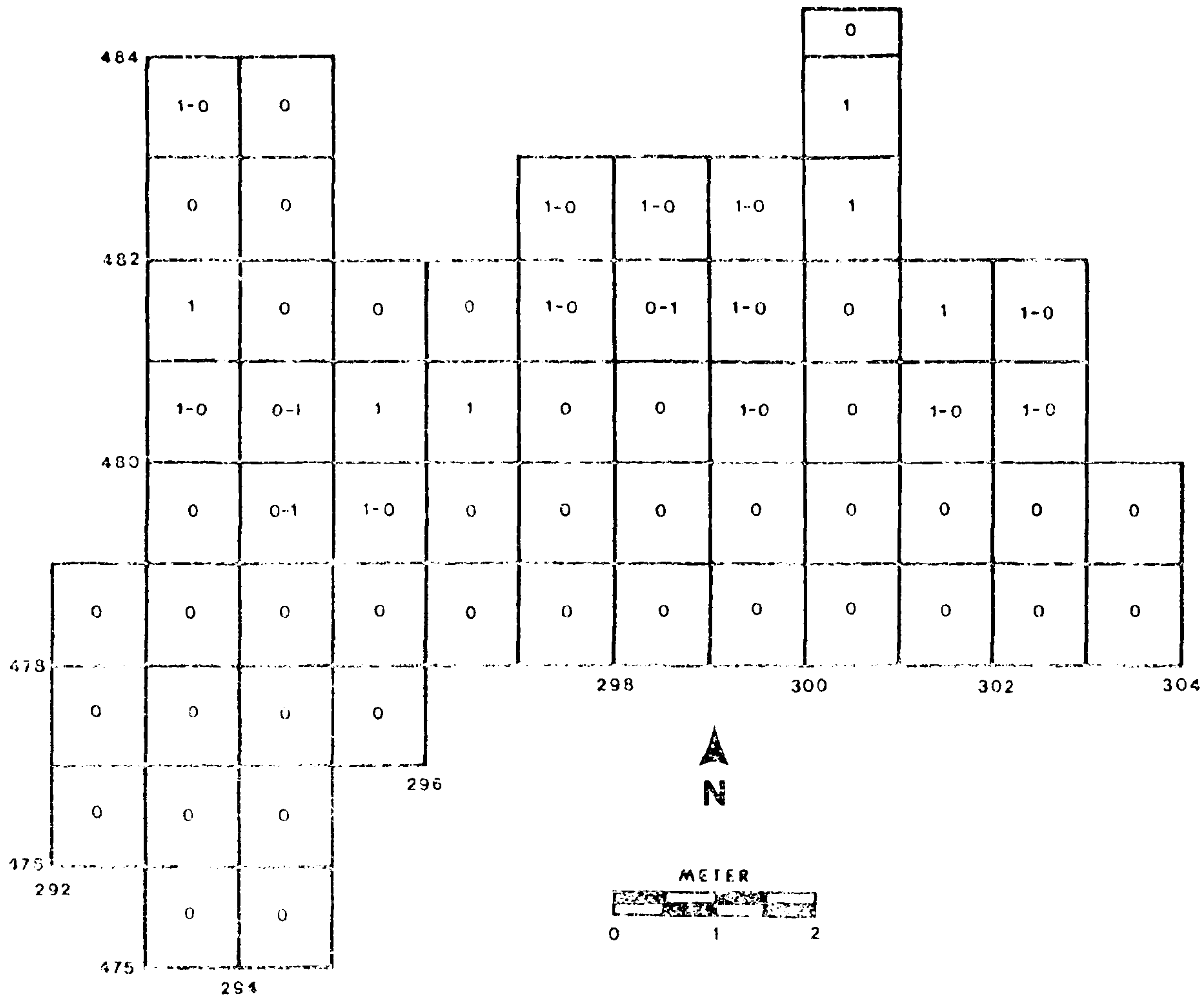

Figure 5.49 Binary map showing the assigned values for each one m^2 in the west excavation at 23JA85.

test whether the values of the contingency table are greater than can be attributed to chance (Dacey 1973:326). The chi-square statistic is calculated by the following formula:

$$X^2 = \frac{n((ad - bc) - \frac{1}{2}n)^2}{rstu}$$

Pottery Type A	Type B 0	Type B 1	row sum
0	a	b	r
1	c	d	s
column sum	t	u	n

The quantity X^2 is distributed as the chi-squared distribution with one degree of freedom. The results presented in Table 5.16 do not support the hypothesis of independency, thus imply spatial association between plain and cordmarked pottery (Davis 1973:118).

The above analyses suggest contemporaneity in the deposition of plain and cordmarked sherds in the Late Woodland component at the Sperry site. The styles of pottery are spatially associated. The lack of discernible house structures in the west and east excavations in addition to the association between plain and cordmarked pottery makes it difficult to derive any social behavior patterns.

Summary

The stratigraphic evidence, tests for randomness, and spatial association between plain and cordmarked sherds from site 23JA85 indicate these two pottery styles were disposed of in conjunction with each other, suggesting contemporaneity in manufacture and use. The infrequent occurrence of cordmarked pottery in the preceding Kansas Ctiy Hopewell (Wedel 1943:32; 38; Dr. Alfred E. Johnson, Museum of Anthropology, University of Kansas, personal communication), suggests cordmarking is a trait which first appears in quantity in the Kansas City area with the advent of the Late Woodland period.

The preceding descriptive statistics on the attributes for plain and cordmarked pottery indicate variations within both pottery styles. Tempering material, slips, and rim forms, cross-cut both the plain and cordmarked styles. The selection of cordmarks in association with crushed granite and sherd temper as diagnostic cultural modes, allows recognition of Late Woodland components in the Kansas City area.

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